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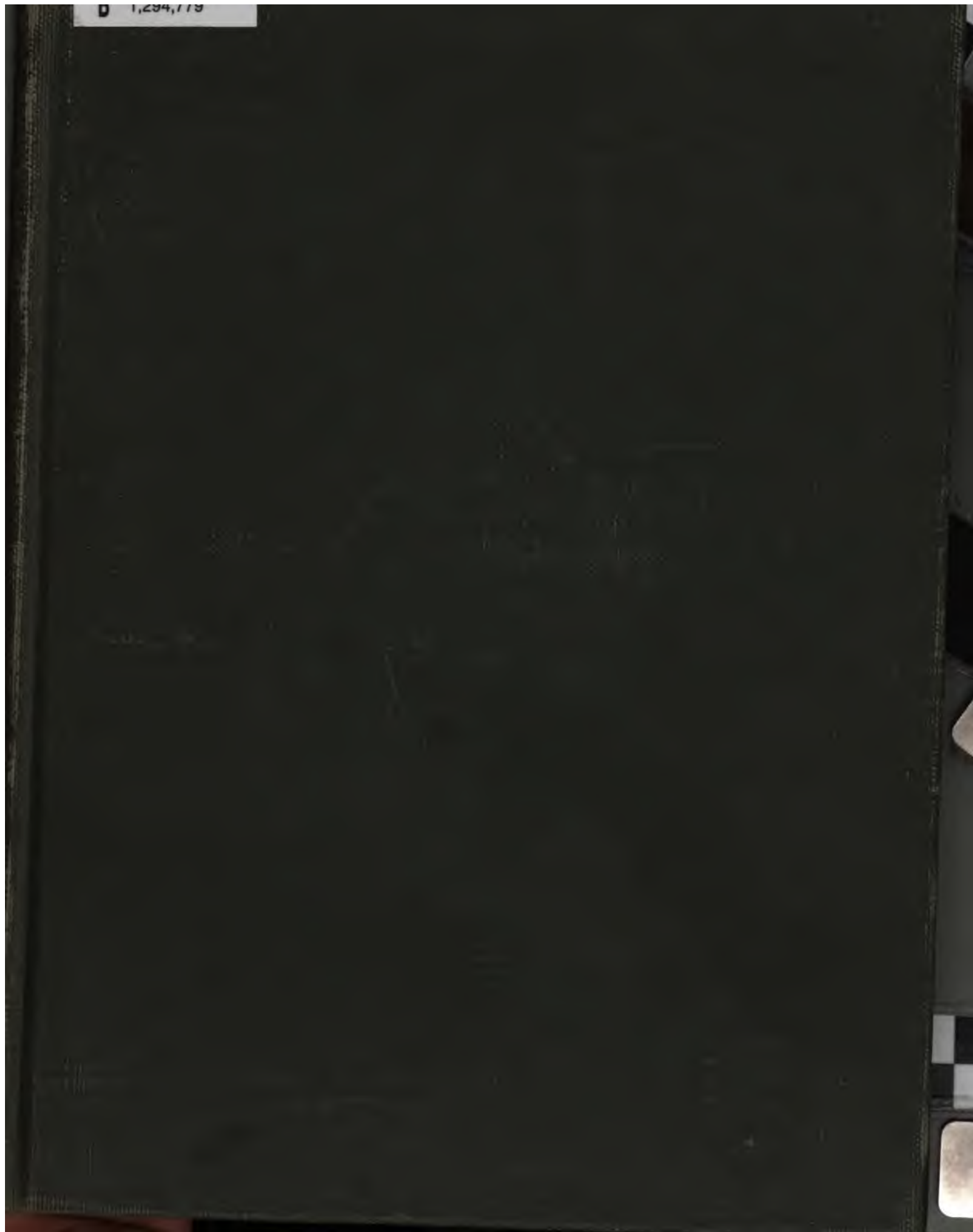
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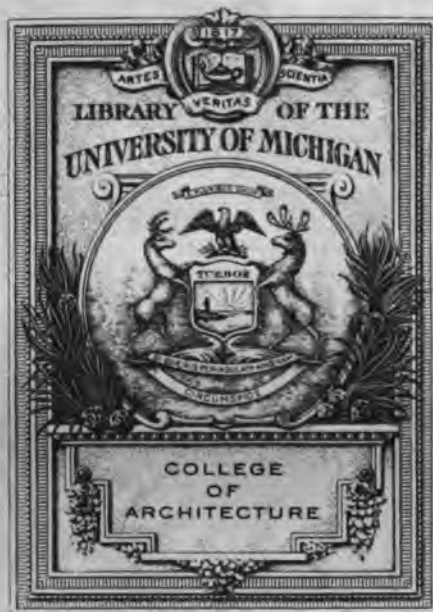
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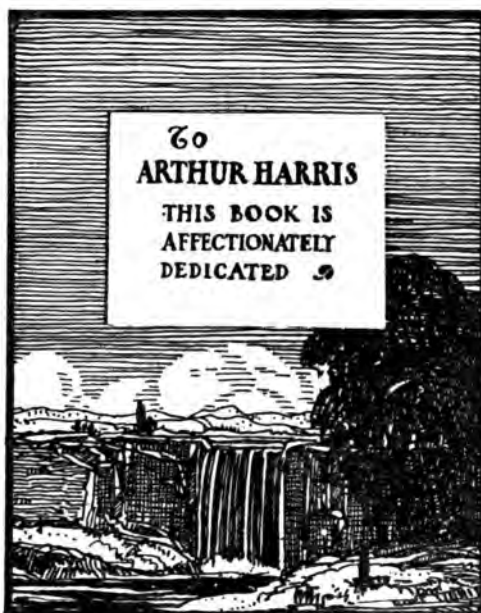
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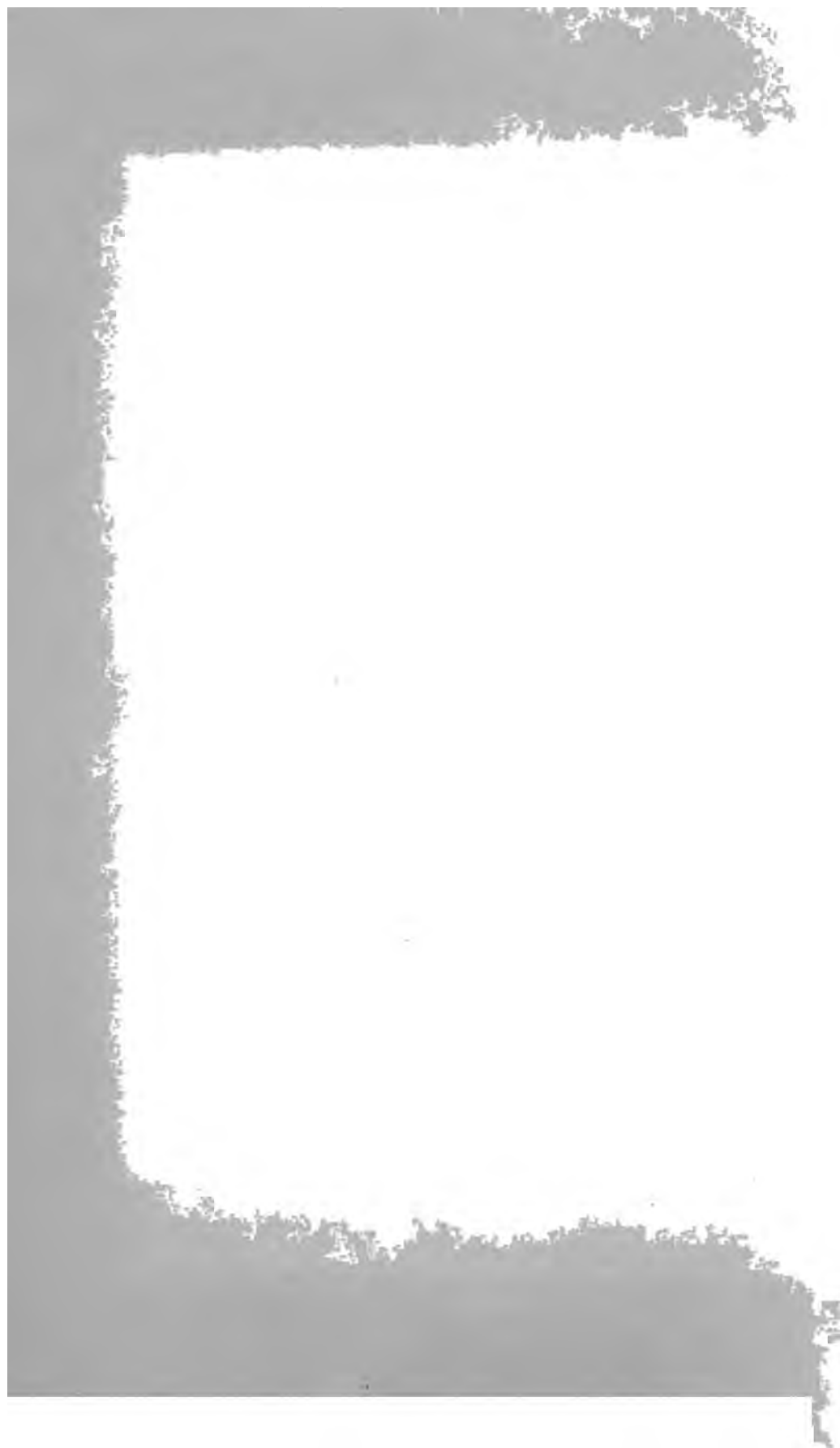
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THIS BOOK IS
AFFECTIONATELY
DEDICATED ♡





PREFACE

THE history of hollow-tile speeds along like moving pictures and to-day's news is but the foundation for tomorrow's forward progress. The field was well-nigh untrodden, when I set forth upon its exploration and in its trackless ways, my feet have led me over deserts as well as lands of promise.

When my articles appeared in *Architecture and Building* they were often valuable as a means of stating that which I sought to prove, and of recalling later what part of it I found to be unprofitable, but at the end of some of these early statements I now may write, "Quod erat demonstrandum." These I have collected in the following pages which I humbly submit to you in the selfish hope that tile's swift progress may not outstrip its printing press and antique its new-born chronicle.

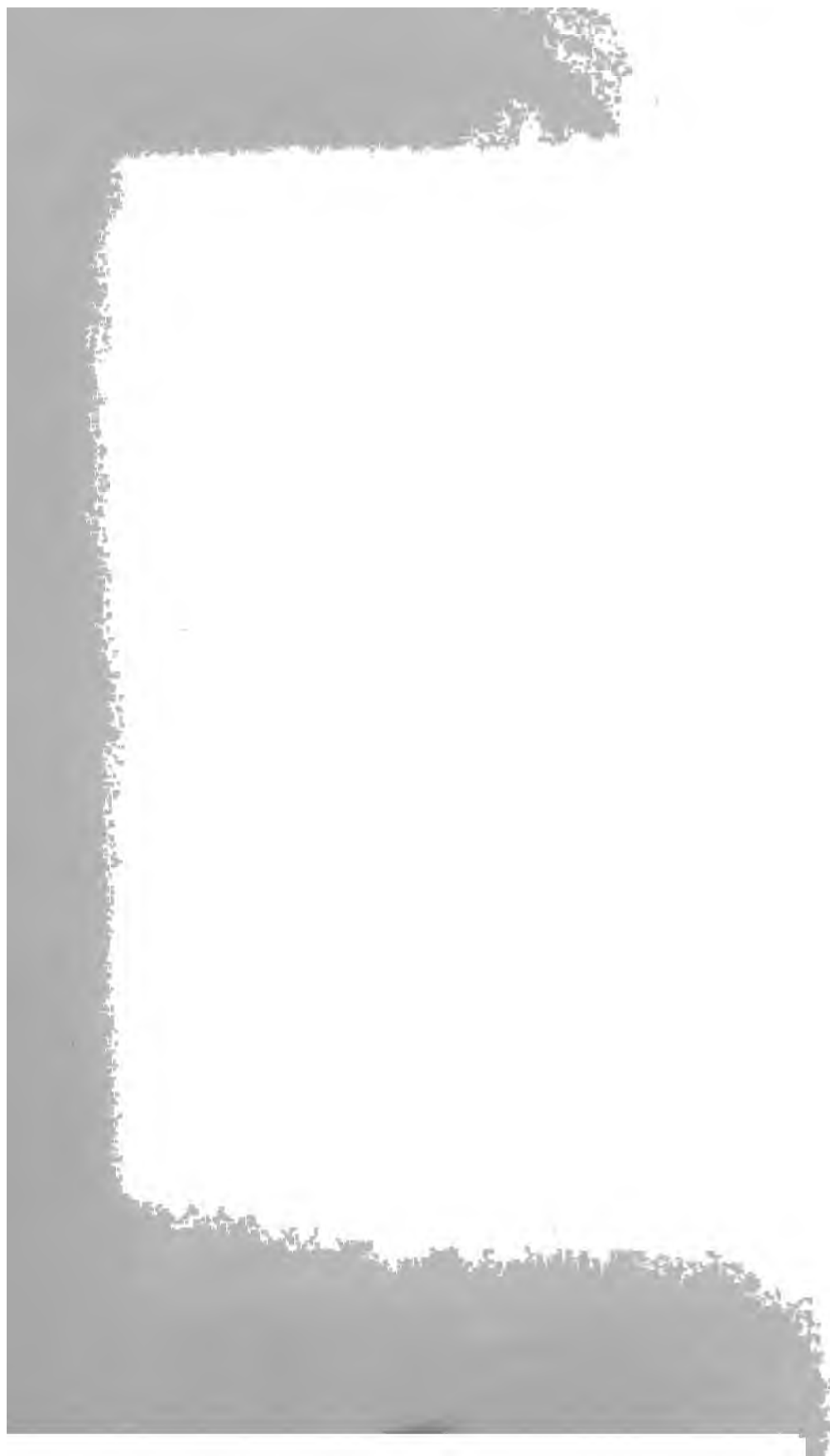
I wish to acknowledge my indebtedness to those good friends who have aided me with picture and experience in this story of a material to which they all are partisan. In particular, I thank my partners, past and present, whose drawings and pictures, collected the world over, have furnished the high lights for the illustrations. Then, too, there are manufacturers, Fiske & Company and the National Fire-proofing Company, who have lent photographs in the same spirit of public education which marks their business policy. Publications like *Concrete-Cement Age*, the *Architectural Record*, and *Architecture and Building*, have encouraged me to spin my yarns, and now that I have collected them between these covers, to them I make grateful acknowledgement.

FREDERICK SQUIRES.

December, 1913.

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INTRODUCTION

OLD-TIME French novelists followed the daring custom of outlining the plot of a story in its introduction, gallantly relieving the curiosity of contemporary ladies without the embarrassment of a peep at the final pages. They believed that each page should be so written that it would hold the reader's attention to itself, despite the fact that he knew exactly what was going to happen. He would thus be the more intimately interested in the development of a tale the outcome of which was to him foreknown. Following this ancient and honorable custom, I am going to tell you the plot of hollow-tile and then elaborate by pen and picture in the desire to lead you page by page to the one marked *Finis*.

There would never have been a book on hollow-tile if somebody in this modern generation, as much a genius at hole-making as Peter Newell with his *Hole-Book*, had not discovered a new way to burn pieces of clay by hollowing them into thin partitions. From Egyptian and Assyrian times to the day of this Peter Newell of hollow-tile, the fact that only brick-sized building clay could be successfully burned had been accepted as incontrovertible. Now-a-days the limit in size is set not by the burning limit, but the weight limit, a difference of many hundred per cent., which has made possible this new construction and this new book.

Our tile houses first appeared in plaster finery, as have masonry houses of many other times and lands. In fact, wherever you find charm in house-clothing, in that country you will find stucco-covered houses, and so struck was I with this thought that I

have selected pictures from Spain, Germany, France, Italy and, best of all, from England, to illustrate the point and show artistic influences on dwellings of to-day.


How are our houses built?, is a question which pardonable curiosity propounds, and a few pages on this subject will not be amiss even if I have to bring in short descriptions of such companion materials as are required under the roof of this house with walls of tile.

Do the arguments for hollow-tile that appeal to the home-builder convince as well the man who builds for sale? Does the architect who knows all kinds of building materials choose tile for his own abode? Such are subtle questions and I am not going to answer them here, but near the middle of the book you will find a chapter which might well be called "Physician, heal thyself!"

Not only may stucco surfaces be pleasantly diversified by the treatment of the plaster itself, but they may be embellished with ornamental tile, and this possibility is illuminated in a chapter of its own.

I remember, as a boy, the joyful work of "branding" when we were called upon to throw back on top of brush-pile fires the burned-off brands which formed dead circles round them. The path of the blaze was upward, not outward, and I have often thought of this when I have seen a so-called fireproof building with fireproof outside walls and fuel floors placed right in fire's natural path. Against such absurdity, a chapter on fireproof floors is aimed, wherein are shown systems for placing real blankets over flames. In this, the sand-molded ceiling gives sparkle to a technical description.

"Tricks of the trade" is the burden of a chapter on the designer's art. In it are given away all those clever tricks by means of which the architect charms beauty out of sticks and stones. After you have read it you can go and do likewise—perhaps—or at least appreciate artistic efforts in your behalf. In it, also, is heard Nature's protest against the atrocities of the untrained hand of man; and in it is shown how a trained hand may still her cry.



Painting with so big a brush into Nature's background demands description even in a tile-book.

Along with such digressions I will essay a word on the subject of concrete and the way architectural embellishment holds its place by means of it beside advances in construction. In fact, for many parts of fireproof buildings, concrete is the necessary partner of hollow-tile. This is particularly true in beam work, and it applies to many of the minor but important parts of buildings. It is through the growing use of concrete as an accessory to other building materials that concrete has made its greatest gains in house construction, and here I will digress from the main topic to explain its partnership with tile.

Will structural innovations change the aspect of architectural design? The question is so hackneyed that it is with reluctance that I ask it, especially since I do not know the answer. Merely as a suggestion, I will write a chapter on flat-roofs. If you have read the book to this point, you may stop and write your own answer to the aesthetic question just propounded. I'm sure it will make, for you at least, better reading than would mine.

Tile is the big brother of the brick. Up to this point in the story its real identity as an external has been covered up, but though long obscured, it will come into its outward own in Texture-Tile. In order to explain it I will call on brick, both very old and very new, to illustrate its aims and point out its ultimate goal, and for this purpose, brick-work from Assyria to America will be shown, and after bricks' lesson has been taught, I will apply its deductions to Texture-Tile.

I've already taken more than my allotted space in telling you about old stucco buildings, stuccoed tile and its treatment, floor making, tricks of the designer's trade, brick and its big brother, Texture-Tile. There will be no chapter marked "Conclusion," for my whole book is but a Genesis.

So I have finished my French introduction. You have the plot. I will now set out on the more difficult feat of keeping your attention to the pages which follow. "Eyes in the boat," I used to

hear the coxswain call to his oarsman in the Fall eights on the Hudson. Fortunately, I have a chance to hold the attention of those eyes of yours by means of pictures chosen from the whole known world and all time.



THE GATE OF JUSTICE OF THE ALHAMBRA. SPAIN TEACHES UNBROKEN STUCCO SURFACES.



THE INNER COURT OF THE ALHAMBRA.



A CALIFORNIA MISSION HAVING THE FAMILY HERITAGE OF SPANISH BEAUTY.

CHAPTER I

Tile-Making.

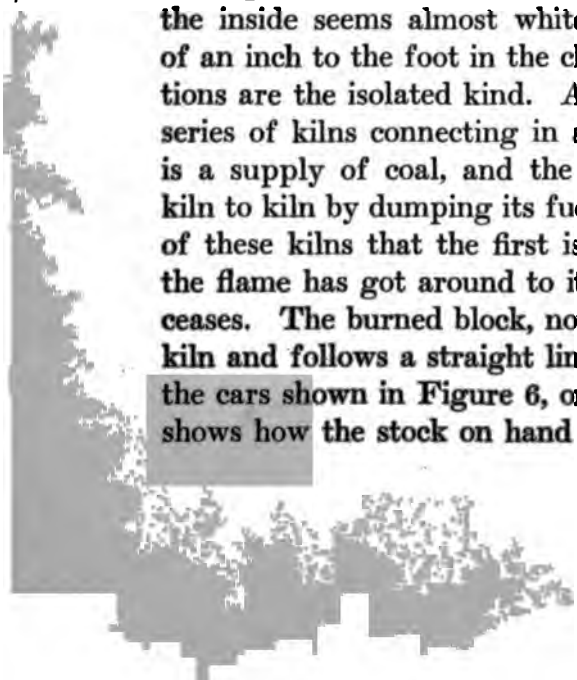
WHEN one needs must begin there is no better rule than to begin at the beginning. Since I know little of geology, earth-building, and the like, my beginning may go no further back than the clay of which the tile is made, but if I start you in beside a clay bank and bring you out beside a fire-proof house, you will have travelled quite as far as these pages ought to carry you.

Distributed all over the United States are clay deposits and New Jersey, around Perth Amboy, where these pictures were taken, is made of nothing else. Figure 1 shows a typical clay-pit and the miners who work it. They have paused a moment for the picture, some with their picks and shovels in their hands and others standing beside the little cars which carry the clay along narrow-gauge tracks to the factory. When the cars are filled they are hauled back, run up an incline to the upper story of the main building where they drop their load through openings between the elevated tracks into the proper bins on the floor of the story beneath. From these the lumps of clay are shoveled on belt conveyors which bring them to the grinder where grog of broken tile for the hard blocks or saw-dust for the porous blocks, is added to the mixture. After this stage it is carried upward on inclined conveyors to the head of the mixer, shown in Figure 2. Water is added and the ground clay, thus rendered plastic, is squeezed by a powerful auger through the die and comes out in a smooth, continuous stream onto the cutting table, shown in the same photograph. It is Colgate's tooth-paste tube enlarged. The man in the photograph with his hand on the cutter, forces the cross wires back and forth at right

angles to the stream, cutting it into blocks the same shape as the finished product. The man with the jaw and the man with the smile take the blocks off and load them on the three-shelved car, a good picture of which is shown in Figure 8. This car has traveled some little distance from the die, and the clay blocks, not yet hard enough to stand erect in the kilns when piled high, are about to be run into long drying compartments where blasts of hot air harden them to stand the strain of piling in the kiln. Burning, the most interesting part of the whole process, is about to take place in Figure 4, where a car load of dried blocks is just entering a kiln, there to be piled from the floor to the top of the dome, with the cores vertical, as illustrated in Figure 5, and then burned into tile.

I will go back over the whole process to show how automatic, labor-saving and consecutive it is. The course of the clay has been in a straight line from pit to kiln. It has been handled once when it was mined and loaded on the car, a second time when it was shoveled on the belt conveyor to the grinder, a third time when it was shaped on the cutting table and put on the drying car, and a fourth time when it was piled in the kiln; only four times in all. Every step has been straight forward, most of the labor unskilled, and not a process but which handles materials in big quantities.

The kilns, most of which are down draft, are heated to such a temperature that to one looking through the little peep-holes, the inside seems almost white. The burning causes a shrinkage of an inch to the foot in the clay. The kilns shown in the illustrations are the isolated kind. Another type I noticed consisted of a series of kilns connecting in a circle with a floor above, on which is a supply of coal, and the fire dragon is made to crawl from kiln to kiln by dumping its fuel food before it. There are so many of these kilns that the first is cooled, emptied and refilled before the flame has got around to it again, and this flaming cycle never ceases. The burned block, now terra-cotta tile, is taken out of the kiln and follows a straight line for delivery by land or water, into the cars shown in Figure 6, or the lighters in Figure 7. Figure 6 shows how the stock on hand is piled, as well as a distant view of





A TYPICAL HOLLOW-TILE FACTORY.



FIG. 1. THE CLAY PIT



FIG. 6. FOR SHIPMENT BY RAIL.



FIG. 2. WHERE THE CLAY STREAM IS CUT INTO BLOCKS.



FIGS. 3 and 4. WHERE THE CLAY BLOCK IS DRIED AND BURNED.



FIG. 5. AFTER FIRING.



FIG. 7. SHIPMENT BY WATER.

the kilns. Another picture shows a comprehensive view of the whole factory taken from a water-covered clay pit.

The thing that impressed me particularly about the manufacture of hollow-tile was its simplicity. Practically nothing is added to the clay from start to finish. All the steps of the process are simple in themselves, absolutely straight forward, with little wasted energy. It is easy enough to believe that anything which should interrupt this orderly procession would add a tremendous percentage to the cost of every block. On the other hand, some features of the process seemed so crude that I believe brains and machines could do the work of many men.

Tile-making ought to appeal to every one with any of the child left in him. It is machine-made mud pies. No one can handle plastic clay without modeling it. As a matter of fact, the Bible intimates that it was a desire to model something distinctly novel out of clay that started the human race "in the beginning."





CAPRI FROM THE MEDITERRANEAN.



AN ARCHED SIDEWALK AT RAVELLO. STUCCO TONED WITH SUNSHINE.



THE VILLA MEDICI AT ROME. A STUCCO COVERED BUILDING ALTOGETHER LOVELY.



THE VILLA BORGHESI IS SURPASSED ONLY BY PERFECTION.

CHAPTER II

Old World Stucco.

THE first hollow-tile houses were always stucco-covered, and since they might follow nearly all of the older stuccoed architecture, they sometimes looked for precedent to the white houses of the Spanish Renaissance. I have illustrated the Alhambra and its gardens and an interior court whose pool reflects the white arcade. On native soil are the Capistrano Mission and San Diego, which hark back to Spanish relatives and hand down an heredity of Spanish beauty. In these Mission buildings, as with the *senoritas*, the light and dark are tellingly contrasted.

Italy contributes far the most studied stucco, for here they use it in the treatment of the most monumental buildings, whence Italian examples are our inspirations rather than our copy-books. Capri is shown, colored in soft tones and as softly mirrored in the Mediterranean. Far above the water and looking seaward over Capri, Ravello stands, a lovely rival. Its arcaded street leads our imagination on to Rome where the villas of Medici and Borghesi are the Mecca of our quest for plastic beauty. There is a charming loggia in the gardens of the Vatican, and at Florence a domed church with a perfect porch.

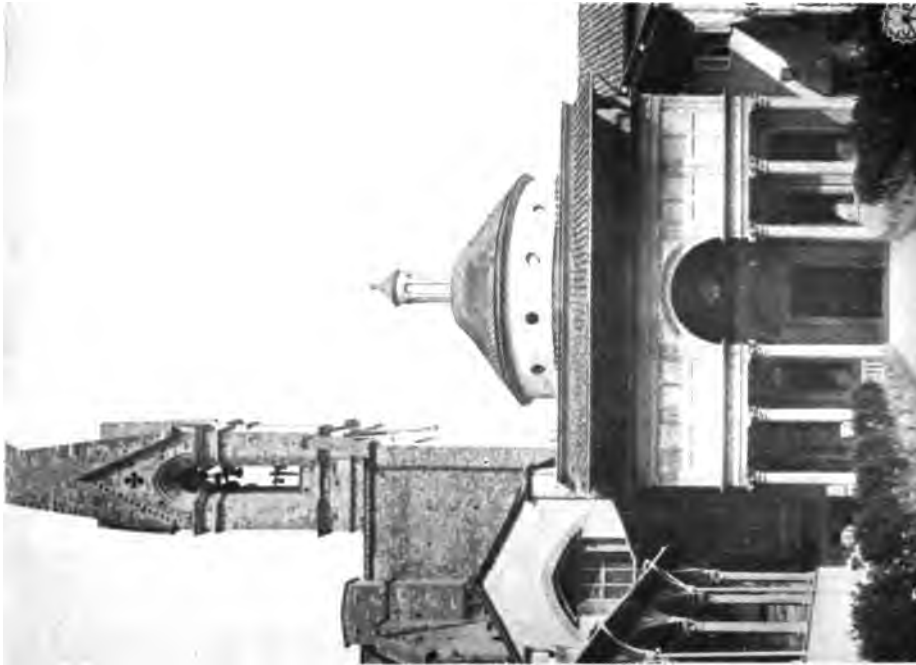
Germany shows wonderful personality in her treatment of skyline and roof, along with clever ways of tooling stucco surfaces. The old town of Ulm is shown from the Danube in the first picture, and below it a charming street scene, doubly told by its reflection in the water. Plain stucco surfaces, half timber, roofs and gables here co-operate. Another scene on a winding street, a charming habitated bridge, and we are through with Ulm for Strassburg, whose architecture is so quaint and free that we are tempted to forget the stucco in devotion to its general charm. When we con-

fine attention to it there is revealed a very skillful handling of the plaster, and picturesqueness in its combination with roofs and timbered surfaces.

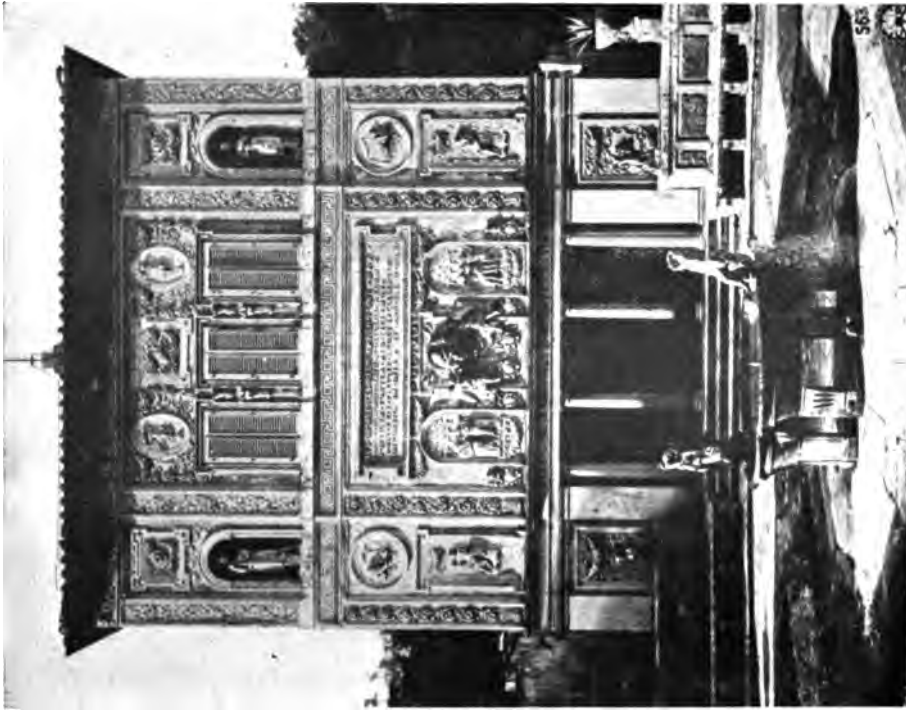
The French examples, one at Chartres, "La Maison du Sau-mon," and an old house near the Cathedral at Rouen, are worthy inspirations. The most dashing in composition, so startling as to seem like one of our own well-beloved perspectives, is the Church and House of the Pages of Francis I. at Chenonceau. The materials here are stone, rubble and cut, interspersed with stucco wall. A bold stroke is the winding stair at Chartres, dark-timbered and set in a foil of white. Two scenes are chosen from Beauvais. One is a street, full of interest, in the Rue Sainte Catherine, by the Cathedral of Saint Rombaut at Malines.

But when all is said and done, it is to England we Anglo-Saxons turn for plaster houses, best-liked and most transplantable. Chiddingstone is introduced with four scenes worthy of any urban architecture. "The Crossings," at Letchworth, once visited by a friend of mine, has served him as inspiration for a successful stucco house. Cockington Village for picturesqueness in roof and wall we may not hope to equal.

I have sifted over a drawerful of foreign buildings for these few pictures. You may have many of those I couldn't use for want of space. But even these pages may well inspire many a native house. Call up reminiscences of your travels, for you may have seen these very places. Translate them into our finer construction and transplant them to our fairer soil. We are leaders in invention and adaptability. Let it be said that in its years alone Europe presents the insurmountable. The dress of our new buildings need not be like Eve's, extemporaneous, but cut after patterns from the good old fashion-books of Europe, selected from the vantage point of our age-long perspective to meet the needs of now.



ARCHITECTURE IN PLASTICS. THE CHURCH
OF SANTA CROCE AT FLORENCE.



SCULPTURE IN PLASTICS. IN THE GARDENS OF THE
VATICAN.



THE STRASSBURG ARCHITECT LOVES NO VIGNOLA LIKE HIMSELF.



"BEAUTY LOOKS OUT ON LOVELINESS." CAPRI FROM AMALFI.



ULM FROM ANOTHER STREET. TEUTONIC ROOFS AND PLASTER WALLS.



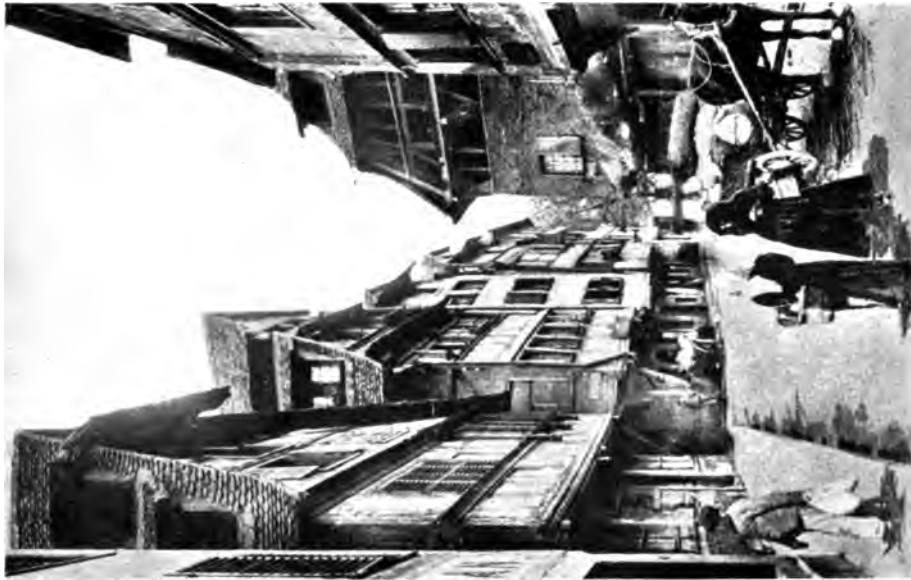
AFTER ULM, FOREST HILLS GARDENS?



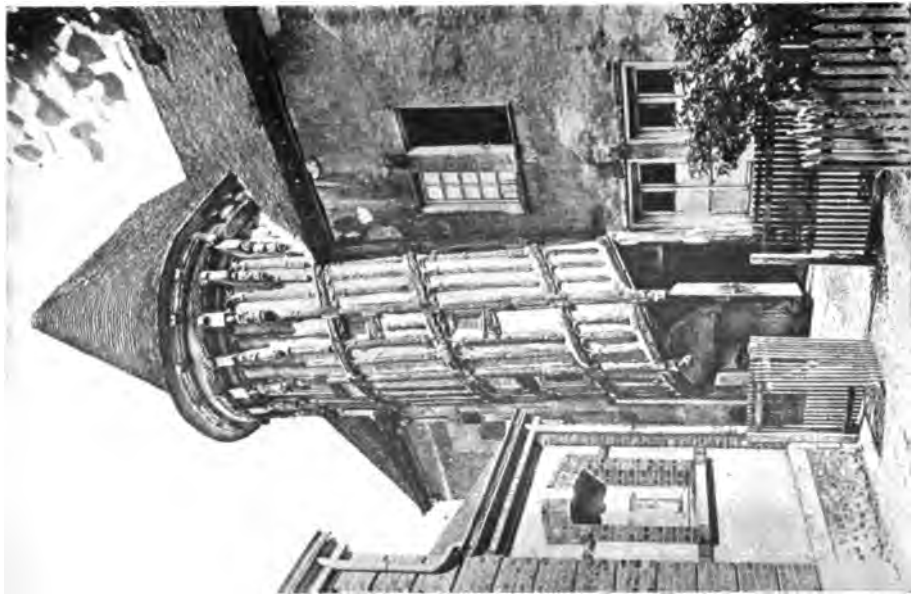
THE STRASSBURG ARCHITECT LOVES NO VIGNOLA LIKE HIMSELF.



"BEAUTY LOOKS OUT ON LOVELINESS." CAPRI FROM AMALFI



STRASSBURG'S OVERHANGING STUCCO WALLS
AND DARING GABLES.



THE ACCENT IN THE FOIL, AN HONEST
STAIR AT CHARTRES.



THE MAISON DU SAUMON AT CHARTRES. STUCCO PICTURESQUE AND RULELESS.



AT ROUEN. STUCCO, AGE AND NATURE.



THE CHURCH AND THE HOUSE OF THE PAGES OF FRANCIS I. AT CHENONCEAU.
NO RULE COULD BETTER ITS ACCIDENTAL COMPOSITION



AN OLD FARM HOUSE IN ENGLAND.



FULL OF PROPHECY OF TRANSPLANTATION.



THE FORGE. WHERE NOTHING IS TOO SMALL FOR CHARM.
CHIDDINGSTONE. ENGLAND.

CHAPTER III

About Construction.

WE need not greatly concern ourselves in a tile book with the carpenter, the plumber, or the electrician. The carpenter does not like our type of work anyway, because it reduces the output of his tinder-box factory. It is about the mason that this chapter centers.

One of the first men you will meet will be the man who digs the cellar, and his duties are obvious. Where is he going to put the dirt? That's an important question. Have him put it where it will stay put. If you don't it is out of your pocket that the cost of moving it will come. When he is through you cannot have too much observation directed to the hole he leaves, for he may be the grave-digger for the corpse of your content. Look out for water! It has done more harm at the foot of foundations than anything else. Now it is easy to correct excess of water even in a water-tight and water-holding soil, for a drain properly placed will lead it off. But when undrained walls are up, the difficulty increases tenfold, and the tendency to inertia in the bones of every one of us argues to let matters stand just as they are in spite of a frog pond in the cellar.

When the concrete work is started you are in the hands of the contractor, for it's as hard to make good concrete as to keep good resolutions, and as easy to make bad concrete as to break them. It is absolutely necessary to count on the honesty and ability of the contractor and his satisfaction with his contract, for right here the matter of the contract comes up.

The competitive-bidding method by which the builder is usually selected is full of evils. On carefully prepared plans and specifications it is usual for bids to vary more than twenty per cent., which

is far greater than the profit which any bidder has figured. It is therefore impossible to believe that this method is free from the fatal fault of guessing. The work properly done is bound to cost a certain sum of money. There is no guess about that, but no two bidders have the same opinion as to what this sum will be. The average owner thinks that contracting for a house is like buying a jack knife, and expects to get the highest guesser's quality at the lowest guesser's price. Unlike the jack knife deal it is only too easy to get a house under contract for less money than it will take to build it, and since the house-building contractor is seldom able to stand any real loss, and although he poses as a principal is really fitted only to be an agent, when the crash comes the owner may pay twice for his jack knife. Bonding the contractor is some protection, and is valuable insurance. It is as good nerve-protection as hollow-tile is fire-protection, and just as necessary. The fatalities among too-low-contractors overshadow the fire-hazard. But before the company on his bond will undertake to complete your house the contractor must have gone into bankruptcy and the ghost of a bankrupt builder is a dull guest at a house-warming. Therefore, don't take the lowest bidder, but the best builder.

Cement for concrete is next to be considered. Pray over it; that's all you can do. It is a mouse-colored powder, and all cements look as much alike to the layman as mice to the ladies. Then see that the bags have a well-known name on them. Sand, to be good, must be clean. Press it in your hand to see if it soils your fingers. Stone is easy to pass on, but its substitute, gravel, is full of insidious snares. Clay in it will stop the setting of cement. Concrete mixing has lost most of its terrors now-a-days, because of the general use of accurate mechanical devices. In earlier days when the god of the machine was of Irish or Italian extraction, the proportions often varied in inverse ratio to the weight of the ingredients. Concrete, well made, is powerful; ill made, is dangerous. Set watch over its making the good safeguards Inspection and Intelligence.

Tile is a more readily determined factor. Its color often is



NO WONDER THEY LIKE TO PAINT IT.



EVERY HOUSE IS A PICTURE AND PART OF A PICTURE. LET THE AMERICAN
STREET STRETCH A CANVAS FOR IT.

CHIDDINGSTONE. ENGLAND.



A VILLAGE OF DOLL-HOUSES. DONE IN STUCCO AND THATCH.



NEARER BY THE HOUSES LOSE NO WHIT OF CHARM
CUCKINGTON, ENGLAND

sufficient indication of its quality. Weakness is usually due to cracked blocks which are easily detected and eliminated.

The part of the wall on which the wooden floor beams rest would seem, at first thought, to be the weakest part, until one sees the tile plates which cover the wall and distribute the load coming from the beam-end over the whole block. When the floors are to be constructed fireproof, the first method used was the formation of beams by pouring concrete over metal rods placed in troughs between rows of tile fillers. This has been improved by schemes for using isolated blocks as a means of forming a gridiron of crossing concrete beams and is of such interest that I have devoted a later chapter to its consideration. The tile and concrete floor must be supported on a false staging until it has set and acquired full strength. Even then a part of the centering is left for some little time.

Efflorescence sometimes shows on the inside of tile walls, discoloring the plaster as would dampness. To prevent this you will often see the mason covering the inside of the wall with a black, sticky paint before the plastering begins. The wall is usually made of single blocks running clear through, and since the blocks vary a little in thickness both the exterior stucco and the interior plaster must be of generous thickness to level up all inequalities. If this is not done the inequalities will not show plainly until the wood work is applied, but then they will be painfully evident.

The hardness of masonry floors presents to the electrician, plumber and steam-fitter difficulties which they have not encountered in working with pierceable wooden beams. To provide space for their pipes, shallow wooden strips are laid on top of the constructive slab and, after the pipes are in place, cinder concrete is filled in between them and the floor nailed to the wood. In some instances the wooden floor is omitted and a plastic floor is applied in its place. I believe that this is the thing to which we are finally coming with advance in fireproofing methods. Granulated cork forms an excellent binder for cement and I submit that this mixture will some day be widely used as a flooring over masonry con-

struction. Cork has many of the qualities lacking or opposed in cement; it is warm to the touch, holds nails, is waterproof and resilient. While this book is being printed I am going to experiment with it.

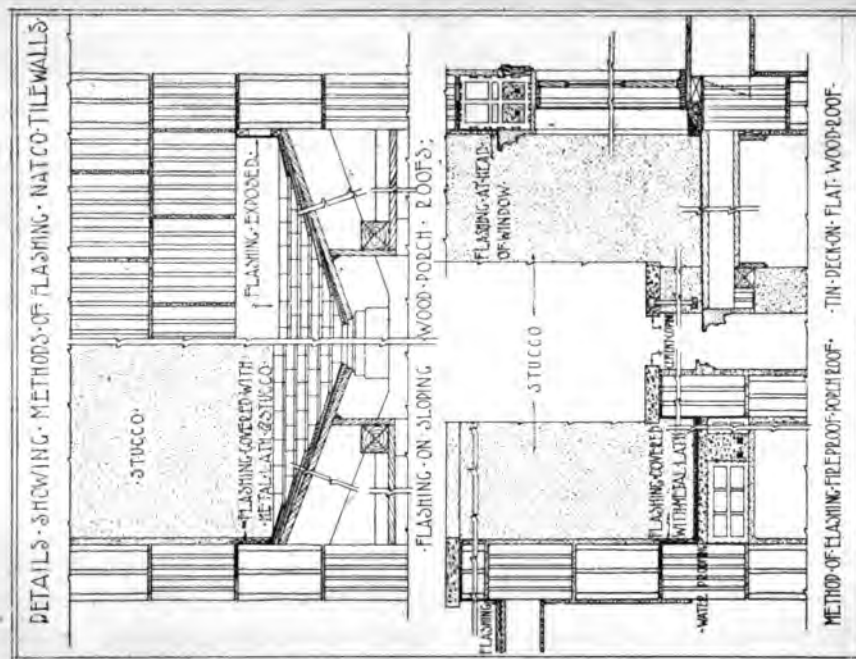
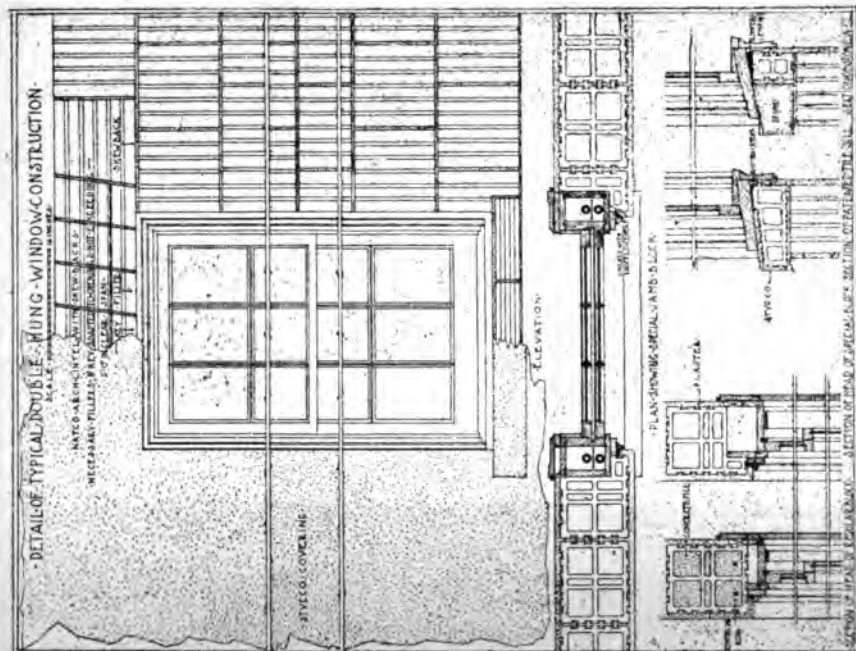
Other materials and work are influenced by fireproof construction, and I offer suggestions which may prove of assistance in understanding them.

The carpenter provides for his nailing by plugging the walls with wood or directing the mason to lay porous tile blocks at the points where trim, base, shelves, wainscots or any woodwork must be secured. He is careful not to pierce his outside walls with brackets and other wooden decorative features, as they are sure to cause leaks.

When the carpenter sets up the temporary forms for floors, he crowns them in the center and securely braces them to prevent the dead load of the floor construction and the weight of the workmen walking about on the floor before it has set, from causing a sag in the forms which will be reproduced in the finished concrete beams. He is especially careful not to remove the girder forms too soon, as the shear-resisting strength of concrete develops more slowly than its compressive strength. Windows and doors are carefully detailed to reduce the chances of leakage at these vulnerable points.

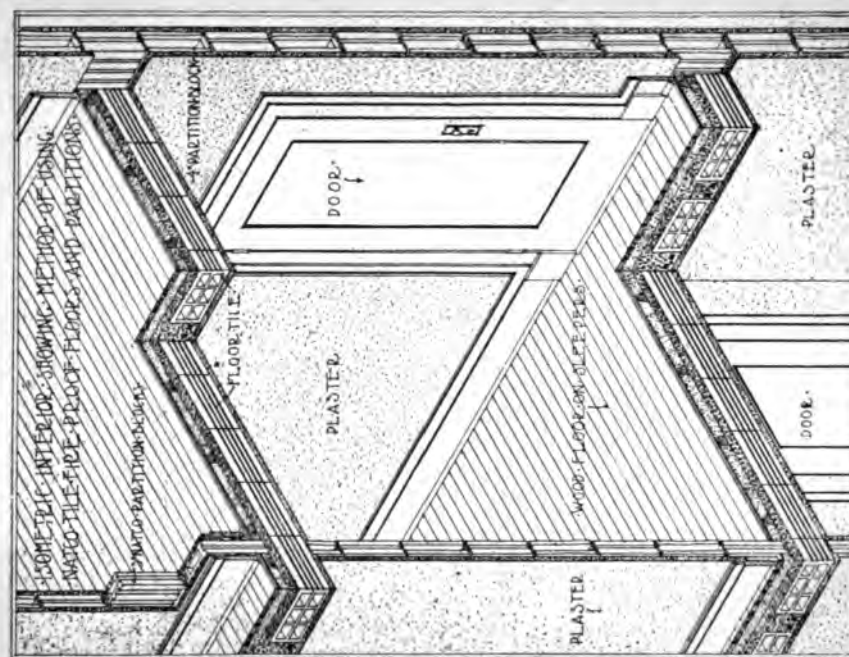
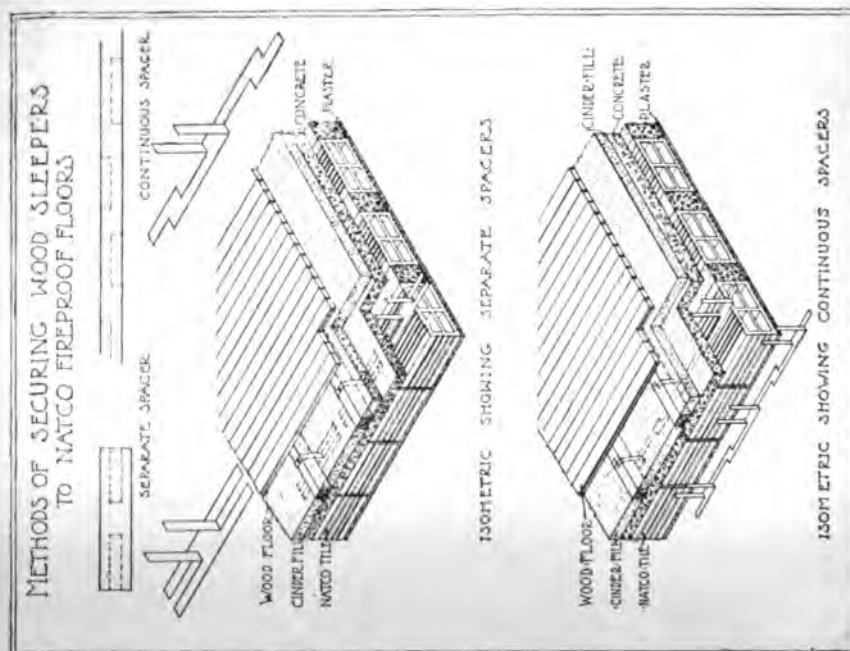
Wood will always shrink away from concrete, and this fact has to be taken seriously into account. In general, too much emphasis cannot be laid on extreme care and thoroughness wherever masonry and woodwork come in contact.

The sheet metal worker must provide carefully against leakage, as water is the greatest enemy of tile construction. Metal protection against leakage, called flashing, is difficult on account of the large size of the tile compared to the brick to which the workman is accustomed. Cap-flashing should be built into the tile-work as it goes up, and every architect knows what a difficult thing it is to get this done, because the sheet metal man is not permanently on the job at that stage of the operation. Heating, lighting and plumbing involve the same difficulties, those of cutting the walls



DETAILS OF NATCO TILE CONSTRUCTION.

Drawn by Squires & Wendelbach, Architects.

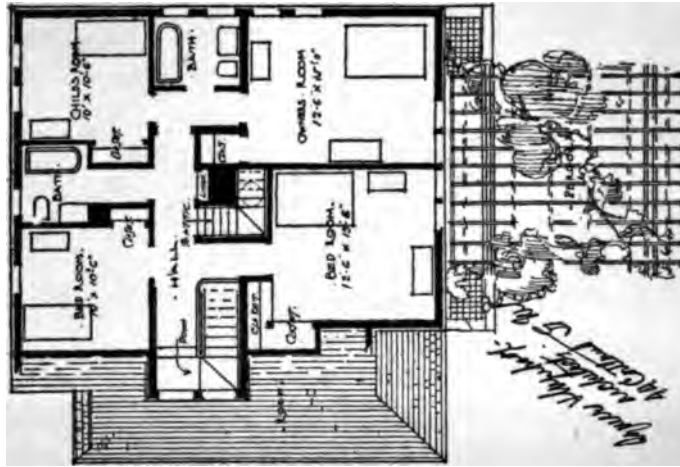


Drawn by Squire & Wendelback, Architects.

DETAILS OF NATCO TILE CONSTRUCTION.

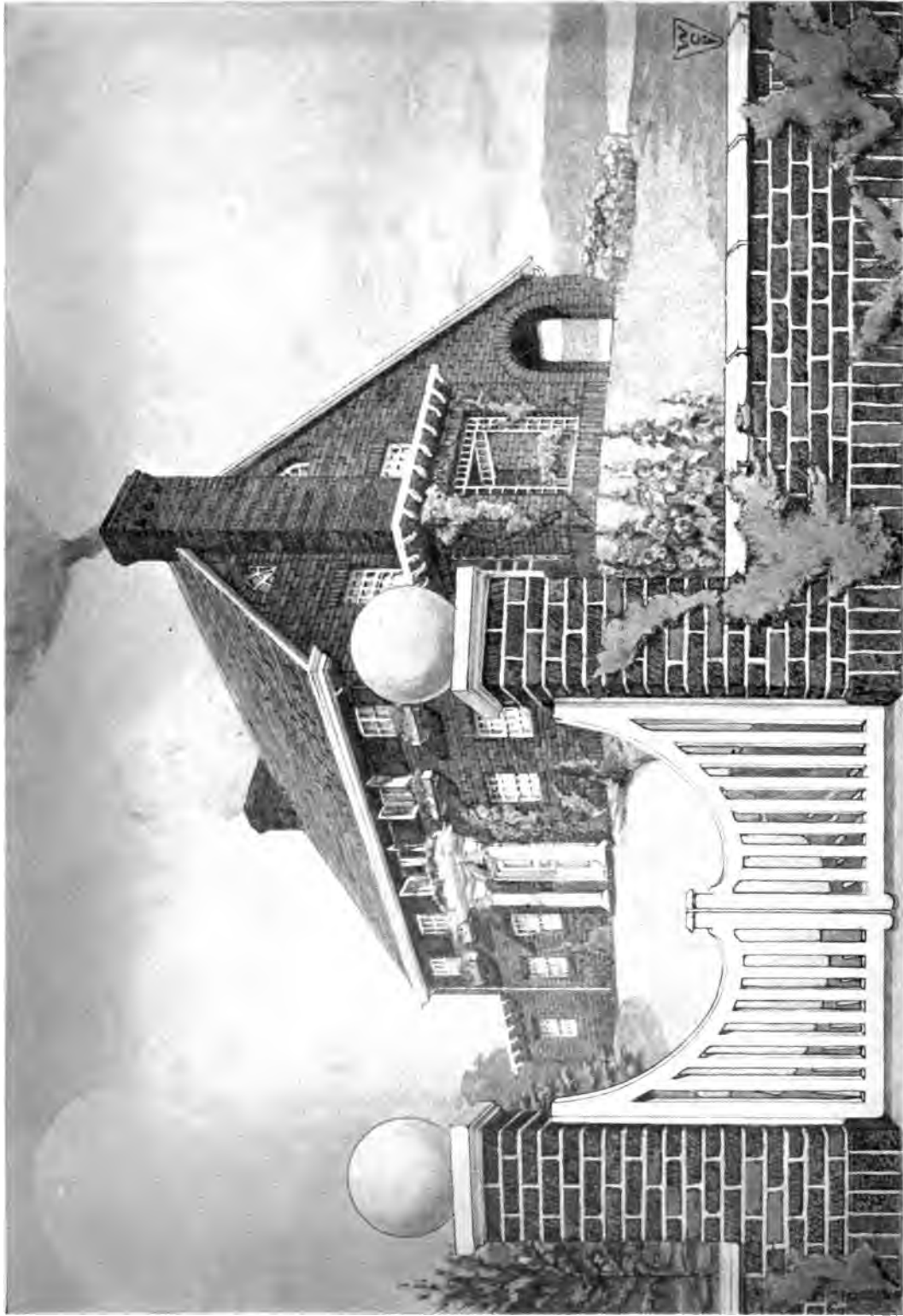
and crossing the pipes on the floors. Nothing is so heartbreaking as to see a carefully erected tile wall cut all to pieces by these three trades. Such cutting may seriously weaken the structure, and one is tempted to lay down the general rule, however radical, that all vertical heating and plumbing pipes must be exposed or put in chases provided in the wall as it is built. If the walls must be cut, it is the business of your architect to consult with the sub-contractors and work out the places where the cutting will do the least structural damage. The horizontal pipes are apt to be crossed on top of the floor slabs and greatly increase the amount of cinder fill necessary to cover them. Heating pipes that run covered in concrete should have loose sleeves to allow for their expansion and contraction. If the electrician, plumber and heater provide rough piping plans, all difficulties may be avoided, and a great deal of trouble averted. It may be remarked here that the heating contractor may figure less heat loss through hollow-tile walls than in any other known construction.

I have now given you a few ideas on the construction of tile houses of the stucco type, and will here let the matter rest until we have taken up the subject of Texture-Tile. Enough has been written to give a little insight into the methods which enter into the construction of your unburnable home.



Squires & Wynkoop, Architects.

PLANS OF THE FIREPROOF HOUSE SHOWN AT THE TOP OF PAGE 146.



THE TEXTURE TILE HOUSE

Copyrighted by The Wm. T. Comstock Co.

Engraved by Hatchel & Manning, Philadelphia

Proctor & Sullivan, Architect



House for Mr. J. J. Adams.

BUILDING WALLS OF HOLLOW-TILE.



House for Mr. A. L. Schaeffer.

TO STUCCO OR NOT TO STUCCO? THE QUESTION IS HERE FAIRLY PRESENTED.



Squires & Wynkoop, Architects.

CHAPTER IV

Counting the Cost.

THAT no man starts to build without first counting the cost is as true as gospel. The first question which a client raises and the hardest to answer is this question of counting the cost. Because of the number of items involved and the great variation in cost of these and of labor in different localities, the final cost until a contract is signed can be no more than an approximation. Most of the disagreements, broken hearts and dead-broke owners have resulted from lack of proper information on this all important truth. I suggest, therefore, that each owner be his own approximate estimator and I will give him a rule-of-thumb to use in making estimates, and the illustrations in this book will show him what he will get for his money.

The safest way to estimate the cost of a building, short of the contractor's method of actual cost of materials and labor, is to figure its cubic contents and multiply the result by a price per cubic foot determined by averaging the cost of a large number of houses of the same particular class. You go about cubing a building in this way: Get the floor area of each section of the building where different sections vary in height, and multiply this square foot result by the distance from the bottom of the cellar to that point, usually half-way up the gable, which would account for the full contents of the cellar, floors and attic. This height is thirty-three feet in the average two story, cellar and attic building. This cubage should include all porches measured from the bottom of their foundations. One may try this out for practice on the working drawings of the Texture-Tile house in the later pages of this book.

Applying these rules to some of the buildings which form our illustrations, we have compiled the following table which will help the man who wants to cut his garments according to his cloth.

| <i>Owner.</i> | <i>Location.</i> | <i>Construction.</i> | <i>Cost per cubic foot.</i> |
|------------------------------------------------------------------------------|-------------------|------------------------------------------------------------------------|-----------------------------|
| Gambee, | Englewood, N. J. | Texture-Tile walls, frame floors and roof... | .171 |
| Marshall, | Tenaflly, N. J. | Hollow-Tile walls, frame floors and roof... | .163 |
| Atwood, | Tenaflly, N. J. | Texture-Tile walls, frame floors and roof... | .188 |
| Lyon, | Englewood, N. J. | Texture-Tile walls, frame floors and roof... | <u>.18</u> |
| Squires, | Plainfield, N. J. | Texture-Tile walls, floors and roofs part masonry and part frame | .20 |
| Average cost \$6739, average cubage 37,441, average cost per cubic foot..... | | | <u>.18</u> |

| <i>Owner.</i> | <i>Location.</i> | <i>Construction.</i> | <i>Cost per cubic foot.</i> |
|---------------------------------------------------------------------------------|------------------|-----------------------------------------------------------------------------------------------|-----------------------------|
| Page, | Orange, N. J. | Hollow-Tile walls, masonry floors, stairs and partitions, asbestos shingle roof..... | .199 |
| Page, | Orange, N. J. | Same construction | .20 |
| Clark, | Newark, N. J. | Hollow-Tile walls, masonry floors and partitions, slate roof | .18 |
| O'Malley, | Newark, N. J. | Hollow-Tile walls, masonry floors and partitions, tile roof | .26 |
| Lough, | New York City. | Hollow-Tile walls, fireproof floors, part masonry and part frame partitions, frame roof | .19 |
| Average cost \$9167.50, average cubage 45,858, average cost per cubic foot..... | | | <u>.20</u> |

The tables show that fireproof floors add ten per cent. to the first cost of a house. You can arrive at the same result in a different way. Wood floor-beam construction costs ten cents a square foot of floor surface and fireproof floors about thirty-five, a difference of twenty-five cents for every foot of floor in the building. The average cost of the non-fireproof buildings in the list is about seven thousand dollars, and they would cost if fireproof, seven thousand seven hundred by the application of the second table for building with fireproof floors. Their floor areas average three thousand feet, which at twenty-five cents a foot would come to seven hundred and fifty dollars, corresponding very closely to the extra cost indicated by the table.

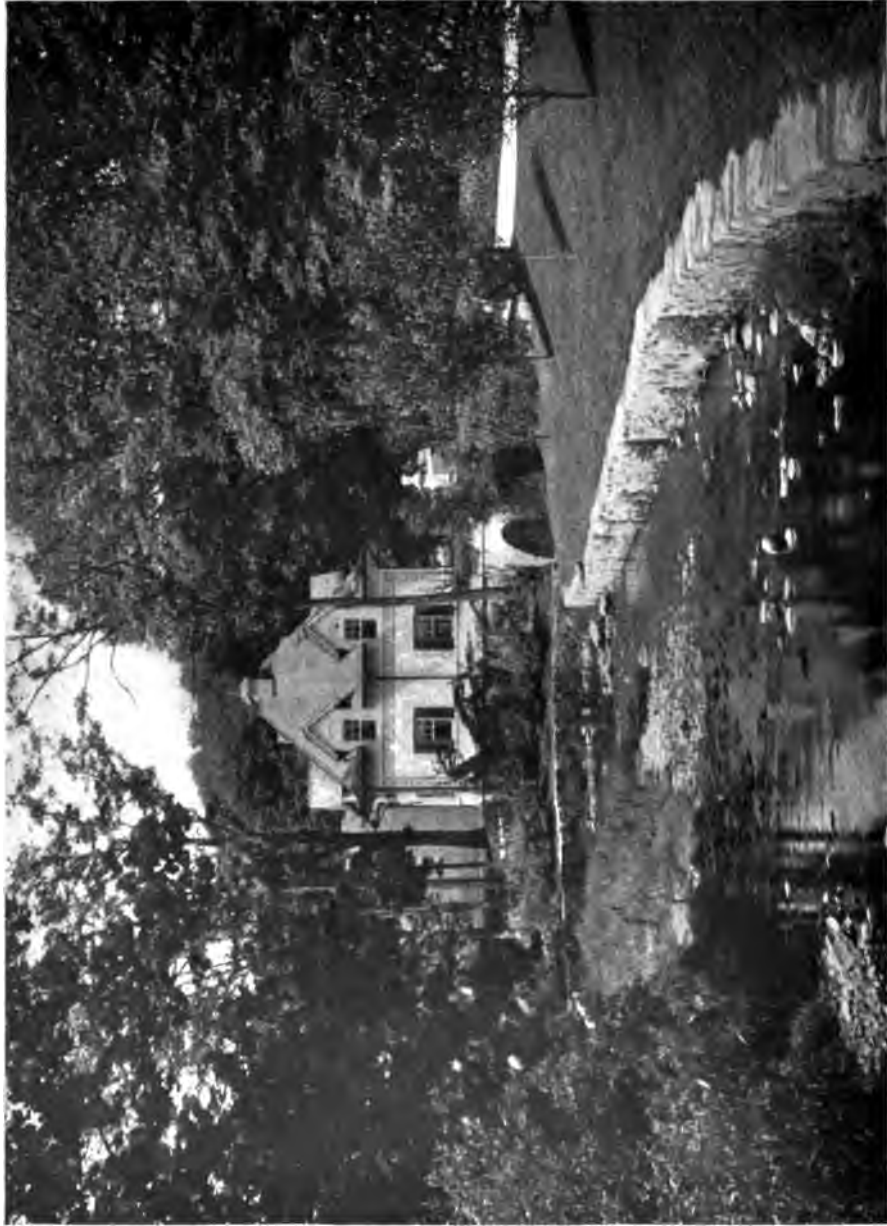
The owner must bear in mind a further fact. Your architect is not and should not be an estimator. The range of his practice



FROM CANTERBURY ON RIVER STOUR. STUCCO WALLS DESIGNED WITH TIMBER AND CASEMENTS, BRIGHTENED WITH FLOWERS.



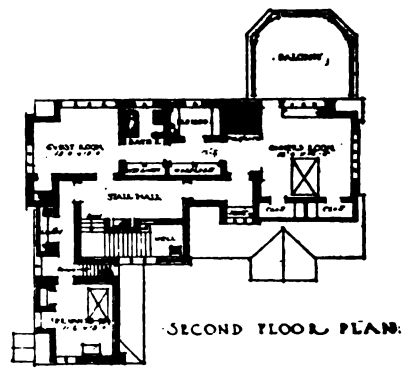
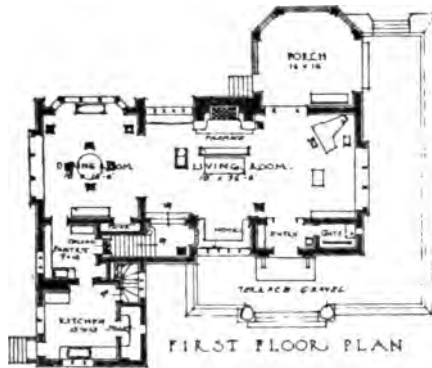
THE WHITE ENTRANCE TO HAMPTON COURT.



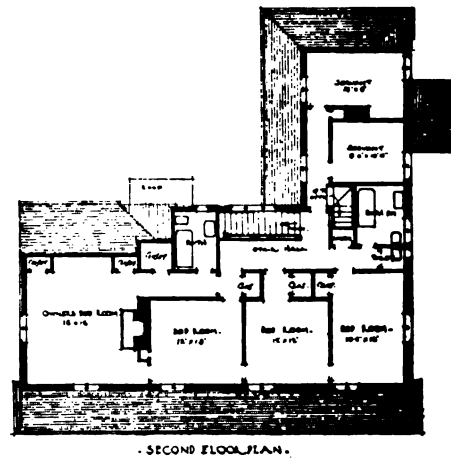
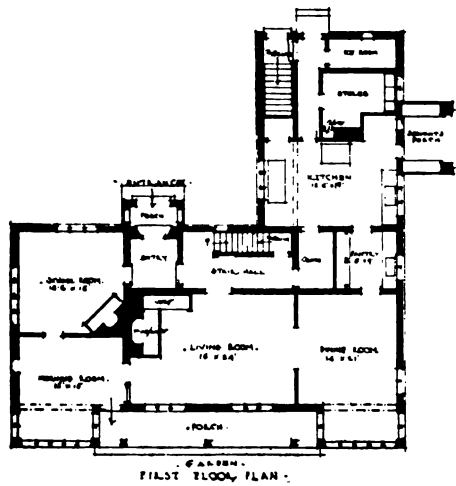
Delano & Aldrich, Architects.

NATURE AND PLASTIC ART.

covers so much other work on buildings of so many kinds that it is beyond his power to tell accurately what each would cost. The builder's training is along estimating lines and his existence depends on his ability to work out accurate costs. It is no disgrace to the architect that he is not a builder and has not the builder's knowledge, but the client usually thinks he ought to be as versatile as a janitor. If he devoted his time to becoming a good estimator he wouldn't have any left to be a good designer. He is your proper agent for reducing your house desires to paper and of finding from experts what they will cost. If he is not made responsible for the cost when given the desires and vice versa, he will be most valuable to you in cutting your garment according to your cloth. In the matter of costs, don't try to make him work the miracle of getting your fixed desires within your fixed price. The days of miracles are past.



THE HOUSE OF MR. KENDALL BANNING.



THE HOUSE AT BOGOTA, N. J.



From "Building Progress."

Squires & Wynkoop, Architects.

AN EXPOSITION OF VARIOUS USES FOR STUCCO COVERED HOLLOW-TILE.



Barnard & Wüder, Architects.

A WELL PLACED TILE HOUSE AT RIVERSIDE, CONN.



Squires & Wynkoop, Architects.

A COTTAGE AT INTERLAKEN, N. J. ONE OF THE FIRST TILE HOUSES
IN THE EAST



Squires & Wynkoop, Architects.

THE FIRST TERRA COTTA HOUSE IN NEW YORK. DR. LOUGH'S HOME AT NEW YORK
UNIVERSITY.



Squires & Wynkoop, Architects.

A HOUSE DESIGNED FOR MR. KENDALL BANNING, AFTER WALNUT-TREE FARM HOUSE IN ENGLAND.



A HOUSE AT BOGOTA, N. J., GIVING ENGLISH ARCHITECTURE IN TERMS OF AMERICAN CONSTRUCTION.



Squires & H'ynkoop, Architects.
THE ENTRANCE SIDE OF THE HOUSE AT BOGOTA. AN ADVANCED CONSTRUCTION FOR ITS DAY.

CHAPTER V

The History of the Use of Hollow-Tile for Houses.

THE previous illustrations have shown foreign applications of plaster to various forms of masonry and are examples from which designers of stucco houses in America have freely drawn. Many modern conceptions are unworthy their solid, foreign precedents. The one American development in fireproof construction which marks an advance over foreign building is not the outer wall so much as it is the masonry floor. The outer walls in both old and new are equally fireproof. The American hollow-tile, so long as it is stucco covered, is similar in appearance and no more fireproof than the foreign wall of solid masonry. It was the introduction of fireproof floors, and sometimes roofs, which marked our first real forward step in fireproof progress. A simple illustration of the relative value of fireproof floors and outside walls is this. There is an occupation, half work, half play, called "branding" brushwood fires which country boys are often called to do. These fires, however fierce, need constant care to insure complete burning of all the brush. Starting at the bottom of the pile, the flames heat the wood above them and savagely ascend, consuming everything in their upward path. But the outer edges of the pile are constantly dying out and the burned-off brands must be thrown back *on top* of the flame. In other words, the tendency of flame to spread upward is far greater than its tendency to spread outward because the heated air rises and cooks the food for the following fire. Wooden floors resting on fireproof walls offer a terrible temptation to fire which is but following its very nature to burn whatever is placed above it. To oppose this law horizontal rather than vertical surfaces should be the real fire bar. The fireproof walls are well enough in their way, but foot for foot give

infinitely less protection than fireproof floors. It is only within the last few years that this phase of fireproof house construction has been appreciated.

It is possible, with this innovation, to build a home absolutely unburnable, so far as its structural parts are concerned. The walls, floors, door and window frames, and even the roof, may be made impregnable against fire. The contents of a room—furniture, upholstery, bric-a-brac, everything—may be consumed and yet the next room be untouched, and this is the real virtue of fireproof construction, the prevention of the spread of flame, especially its upward trend, and by this virtue has America advanced home-building progress.

As might well be expected, the pioneer work has been done in the neighborhood of the great cities, where people are always on the lookout for something better. The most important cities are far away from the supply of wood and this affords a powerful reason for the use of fireproofing materials, for the freight rate on lumber has to be added to its cost. So it is that in the suburbs around New York, Philadelphia and Boston indestructible materials are most widely used.

The most startling manifestation of the new movement is Mr. Edison's plan to have "moulded" homes for workingmen. His scheme is to build a set of moulds, put them in place, and pour into them the liquid mixture of rock, sand and cement. The mixture once in place and presto, change! behold your house of rock! The same moulds will be moved on to the next lot, and another house constructed in the same way. Of course this plan would not leave much room for originality, since every house in a line would be like every other. Mr. Edison's purpose in suggesting this was not an aesthetic but a practical one—it was to save the workingman's money.

Now it is agreed among experts that this scheme will not soon be materialized. There are certain physical difficulties, due to the present limitations which surround concrete construction, which would, until overcome, prevent the moulding of a unit house. But



House for Mr. J. J. Adams, Upper Montclair, N. J.
Squires & Wendehack, Architects.
TILE IS ADAPTABLE TO THE MOST IRREGULAR OUTLINES.



House for Mr. J. P. Taylor, Tenafly, N. J.

Squires & Wendhack, Architects.

A SHADOW-TEXTURED ROOF WITH TRUNCATED, TEUTONIC GABLE.

the proposal is worthy of the thought the inventor has spent upon it, even if it does nothing but stimulate interest in fireproof construction. Adaptations of the idea have already proved practical and there are many concrete houses—though they are not made in the Edison style—and there are many more houses in which concrete is used in combination with other materials.

Hollow-tile is the material for fireproof construction which has made the greatest advances. Until recent years it was employed almost exclusively as a metal protecting material, pure and simple—that is, it was used to fireproof the steel structural parts of high

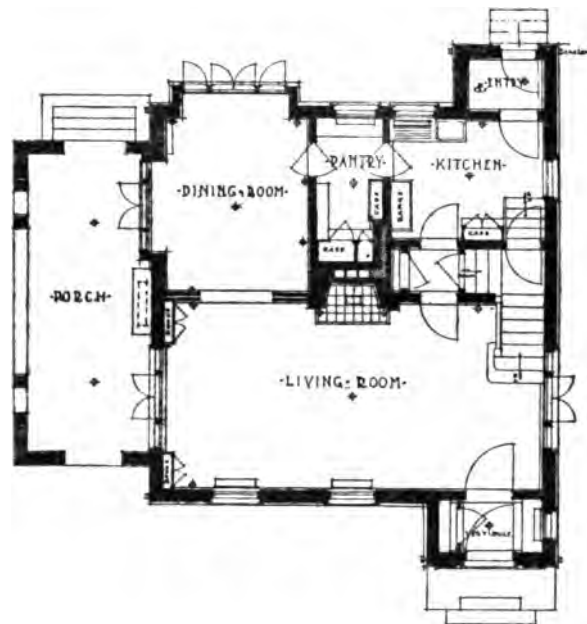


HOUSE FOR MR. J. J. ADAMS

buildings. Hundreds of thousands of tons of these hollow blocks are used in skyscrapers. It was found, first by accident and then by elaborate tests, that hollow terra-cotta blocks when used in walls independent of other materials than mortar, would support greater weights and strains than could ever be imposed upon them in houses. They are laid into walls like big brick. Engineers have devised methods for their use in floors, in combination with concrete beams; and they are also used in roofs in the same manner. They possess the advantage over ordinary brick of having weightless hollow spaces which act as non-conductors of heat, these voids being cost-

less as well as useful. In the architect's hands the material has been most successful, and I am going to tell you why this is true.

One reason is that the plaster houses abroad have provided artistic inspiration for plaster covered hollow-tile, but it is yet to be entirely explained why the construction has taken so strong a hold on our best country house designers. The answer to this may be found in the effect on design of its structural perfections. A



HOUSE FOR MR. J. P. TAYLOR.

building with masonry outside and inside walls and floors and roof is a masonry cube in itself and practically indestructible. It is hard to crush an ordinary box. If this box is made up internally of a lot of little boxes entirely filling it, the only way to destroy it is to burn it up. A fireproof house is a box filled with little boxes, and you can't burn a fireproof house. Flame has no terrors for it, nor have time and the elements. This permanence makes the design of the house a serious and important matter. Such a building is a monument, a thing that will last through many a change in style.



House for Mr. J. P. Taylor.

**HALF-TIMBER PARALLELS THE TREE-TRUNKS AND A TWENTY-DOLLAR STONE
WALL PROVIDES THE CONTRASTING LINE NEEDED TO SATISFY
THE COMPOSITION.**



Home for Mr. Wm. C. Calkins, Jr., Flushing, N. Y.

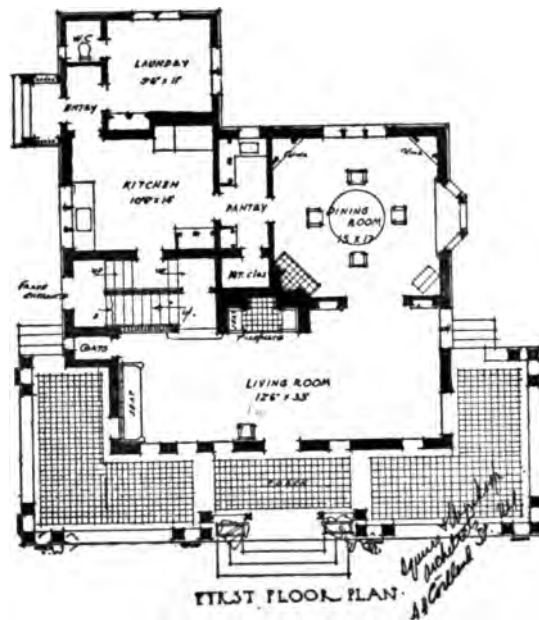
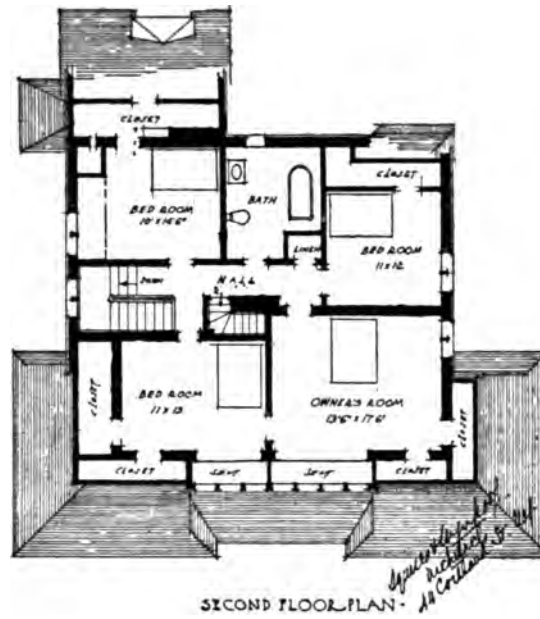
Frederick Squires, Architect.

BRICK USED TO ENLIVEN STUCCO SURFACES.

and passing fancy, and will hold its own as a design only by intrinsic worth. Permanent works have always been the most beautiful. It is then true that the knowledge of the permanency of masonry adds seriousness to its conception in design and results in simplicity and beauty in execution. The designer grasps eagerly at the opportunity to work in these permanent materials, because he knows from historic examples that with them the most worthy results may be obtained. It is this reason, beside foreign precedent, on account of which designers have devoted themselves wholeheartedly to hollow-tile.

It is a mooted question whether this masonry construction will result in an entirely new style of house. It is easy to borrow from almost every style and adjust to it. The English country house, the Georgian, the Italian villa, the Spanish patio, all the white buildings abroad, have served for suggestions. The feature in this construction which may lead us away from all precedent and tradition is the masonry roof. In many cases, the difficulty of designing a masonry roof in a traditional style has led to the abandonment of the masonry roof and the retention of the traditional style. Sometimes a masonry roof has been designed in spite of its difficulties and in spite of the fact that the resulting roof does not suggest its permanent character. The characteristic masonry roof is a flat roof. Characteristic design of fireproof houses with a flat roof is a thing not yet accomplished, but should it be accomplished and popularized, there would be created immediately a new style due to this masonry construction.

There are many kinds of buildings, to which the fireproof quality of terra-cotta tile is even more important than it is in the home. In the first instance the scheme scrambled from the skyscrapers to the cottage, overlooking in its haste its intervening opportunities. Now, however, its fireproof qualities are being called into play in the school, the hospital, the hotel, the apartment and the factory. In all these buildings, fireproofness is an asset of first importance, and the fire hazard is multiplied many times over its danger to the home. It is with a feeling of considerable



PLANS OF THE HOUSE AT SEA GATE, N. Y.



A SKYSCRAPING BUNGALOW.



House at Sea Gate, N. Y.

Squires & Wynkoop, Architects.

FIREPROOF THE SUMMER COTTAGE AGAINST THE FIRE RISKS OF VACANCY!



House at Greenwich, Conn.

Delano & Aldrich, Architects.

DETAILS WHICH EMPHASIZE THE MANIFOLD ADVANTAGES OF
KNOWING MORE THAN "YOUR UNITED STATES."

content that a mother sees her children go to a fireproof school. It is not a difficult feat to convince a factory owner that it is good business to insure his main investment of machinery and stock by means of the small extra cost of a fireproof building. He prefers fire prevention to insurance collection. It is in these buildings also that the reduced cost of upkeep is a convincing argument. The requirements of the layout of such buildings are easily met in hollow-tile construction.

Lest this discussion prove discursive, I am going to pin it down to realities by illustrating with photographs and drawings of modern houses, the points which I have tried to make. The first is an illustration of a house designed purely for the purpose of illustrating various uses of hollow tile. Today such a house would not be the last word in this construction, but when it was designed some few years ago, such questions as exposed tile and flat masonry roofs had not become insistent. It will not be hard to find its precedent among the foreign illustrations. Its simplicity makes it easily constructible in tile.

The very pioneer in the East was the DeVillaverde house, which is the first photograph, and but shortly behind in time of construction was the Lough house.

The thing which I recall most clearly about these early houses was the financial difficulties in which the builders usually found themselves before the work was completed, although they received more money for them than would be necessary to finance their construction today. These men had the right idea and the courage of their convictions, but met the fate which befell the Englishmen who tried to tunnel the North River and the Frenchman who started to join the oceans at Panama. Although they were victims, they lacked only the power, not the courage of their convictions, and others, less originally initiative, won the battle of their starting. Crowds of interested spectators used to watch the construction of these early houses, people who today would not stop to look at a similar operation, so often have they seen them.

It is interesting to follow the steps in the design of the Bogota

building. The half-tone shows the Banning house, an adaptation of Walnut Tree Farm House in England, which was restudied, as shown in the photographs of the completed building. Structural features of unusual interest are the treatments of the ceilings and floors. Projecting concrete beams were cast between the hollow tile fillers and the finished floors were of plastic composition with no wood covering at all. I believe that this method will some day come into its own in the general use of a combination of cork and cement, which bonds and makes a warm and noiseless floor. This house was an advanced construction in the day of its building.

The house at Upper Montclair, N. J., is a good example of the extent to which site may influence plan. At the foot of a palisade and itself remarkably elevated and overlooking New York in the far distance, this building was elongated in plan to take advantage both of the view and the contour of the site. Every room looks forward to New York and back to its garden at the mountain-foot. An interesting constructive feature is the corbelling of the gables, learned from Mr. Joy Wheeler Dow. I always feel when looking at this house that it is but an unobtrusive incident in a well-staged scene. Where you can't fight you had better follow. An obtrusive house at the foot of this rock-ribbed crag would be only fussy in its indignation. Such an unequal contest between the stolid and the stuccato would recall Kipling's lines:

"For the Christian riles and the Aryan smiles
And he weareth the Christian down."

That heathen crag could smile his rocky smile over and around the importunities of any upstart domicile of man and keep on smiling while its roof tree rotted, but the right kind of a house would nestle at its feet and gain protection from its greatness, just as this house has tried to do.

"Made in Germany" is the trade-mark of the Tenafly house. Even the stucco tooling is Teutonic. The charm of the house, aside from a setting among straight tree trunks which parallel its half-timber, is the happy combination of its colors. The roof shows green and brown with a "texture" about which you will hear later.



Wilson Fyre, Architect.
AN EFFECTIVE COMPOSITION OF A COMBINATION OF SMALL HOUSES AT FOREST HILLS GARDENS.



Grosvener Atterbury, John Almy Tompkins, Associate Architects.
A HOUSE WHICH WOULD LOOK IN PLACE AMONG THE FOREIGN EXAMPLES OF STUCCO-COVERED BUILDINGS.

Buff stucco and natural-colored cypress fit the scheme of the house itself and its surroundings.

It would be well to read the chapter on tile decoration of stucco surfaces before looking at the Calkins house. Rough surfaced brick in intricate design has been used to mark the openings and to elaborate the frieze. Red tile, brown brick, grey stucco and tan wood are the palette of its colors. The house is a little different from anything else in these pages, and a helpful feature is the big tree standing like a lofty guard above it, and softening too rigid outlines with its grateful shade. Character in plan is accomplished by a large living-room several steps lower than the rest of the first floor.

Closeness to precedent does not mark its neighboring illustration, a house at Seagate, which reminds me of the Dutchman's remark about a "rather mountainous valley." The owner wanted a bungalow but he wanted it three stories high. The building presents the singular spectacle of a simple roof set down over an irregular plan and cut off regardless at its intersection with the walls.



Squires & Wynkoop, Architects.

PLANS OF THE FIREPROOF HOUSE SHOWN AT BOTTOM OF PAGE 106.



THE HOUSE OF MR. THOMAS H. KERR AT WHITE PLAINS, IS A CHARMINGLY NATURALIZED FOREIGNER.
Albro & Lindeberg, Architects.



Home of Mr. Wirthrop, Nisset, L. I.

Delano & Aldrich, Architects.

THE DESIGNERS HAVE ACCOMPLISHED A BIG, WELL-MANNERED HOME. YOU WILL NOTICE THAT THERE ARE NO DORMERS AND THAT THE HOUSE IS NOT ON THE HILL TOP BUT PARALLELS THE SLOPE.



Home of Mr. Winthrop, Siosset, L. I.

Delano & Aldrich, Architects.

IT'S JUST AS PERFECT NEAR BY AS AT A DISTANCE.



House of Mr. Thomas H. Kerr.

Albro & Lindberg, Architects.

"A PLACE FOR REFLECTION."

CHAPTER VI

Architects' Tile Houses.

"PHYSIcian, heal thyself," might be the title of this chapter, although the way and why the architect doctors his design is not always the best way and why. I have worked for several who are high in their profession, and it is curious that no one of these men, some of whom were capable designers, spent much time on the design of his own house, although each gave careful thought to its construction. Since they excel in these it is, therefore, rather toward the constructive features than the architectural that I would direct your attention in the following pages. Herein have architects cured building ills.

The Wendehack house was designed after a most careful study of individual needs. The drawings were made in Rome where their designer spent many months of a stay abroad. The plan is nearly ideal for a house of its size, and the construction also is particularly well studied. The Walker house was completed by its architect-owner, and is as well constructed as it is obviously beautiful.

Every building consists in its final analysis of uprights resting on the earth, supporting floors and roofs, and filling between these uprights, to keep out the weather and to surround the windows and doors. The supports may always be regarded as posts. Logically, they should be thicker or at least stronger than the curtain walls, but in most instances, in order to avoid breaks in the wall surfaces, the piers and walls are made of a uniform thickness. The scheme of permanent tile forms here comes into play as in the Delano house, in order to obtain a pier and a curtain wall with strength relative to their respective loads, and yet maintain a flush wall inside and out. It is obvious that this may be done in tile walls

by grouting the piers and leaving the curtain walls hollow. When a floor level is reached it is obvious that there should be some way to carry the part of the floor weight which comes over the window and door openings to the powerful piers, and this may be done by a U-shaped continuous wall girder.

These U-shaped lintel and wall girder troughs may be either poured full of concrete on the ground and set in place as is best practice with the lintel, or set in the wall and poured in place, as is best done with the wall girder. The floor load will then have a strong continuous support irrespective of the openings under it.

It is the limitations of tile manufacturing which give us a hollow building block with the physical aspect in which we find it at the building. Were it not for the manner of moulding and burning clay, the block might be any other shape than cellular. Given, then, a large building block with cells running in one direction only and open on two of its six sides, our problem is to make the best use of it as building material. It would seem to be the best way to lay these blocks in a wall on their closed sides so as to get a good mortar bed, but on closer observation it is apparent that by so doing a part of the terra-cotta would be resting flat and not working to hold up the weight above. The block must have its webs vertical in order to be entirely onto its job. But when set vertical the mortar bed must be on the webs of the lower block and not on its flat side, and we are, therefore, confronted with the difficult feat of balancing mortar on a five-eighth-inch web and bedding a forty-pound block on this precarious footing. It is apparent that unless this feat is successfully performed the blocks will come in contact vertically only at points and not all along the webs, and that not all of the webs may be counted on to be doing work. This causes no inconvenience in the house where the wall is far stronger than required for the load, but it becomes a problem to be taken into account in heavily loaded piers.

Although the placing of the blocks in the wall with the cores vertical does not present a very good mortar bed, yet it invites a far more powerful construction than any combination of mortared



THE PROBLEM OF EVERY INCH WAS STUDIED AND SOLVED.



Home of Mrs. D. F. Wendchack.

Squires & Wendchack, Architects.

"MULTUM IN PARVO." AN ARCHITECT'S FIREPROOF HOUSE.



WM. ADAMS DELANO'S COUNTRY PLACE AT SIOSSET, L. I.



HE HAS COVERED THE TILE WITH STUCCO HAND-MODELED LIKE
PARGED STONE WORK.



THE COURT OF MR. DELANO'S HOUSE. AN ARTIST'S WORK AS WELL AS AN ARCHITECT'S.



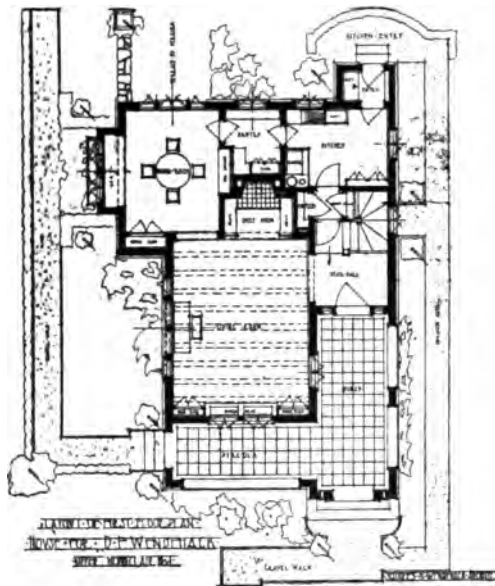
W. Leslie Walker's Own House.

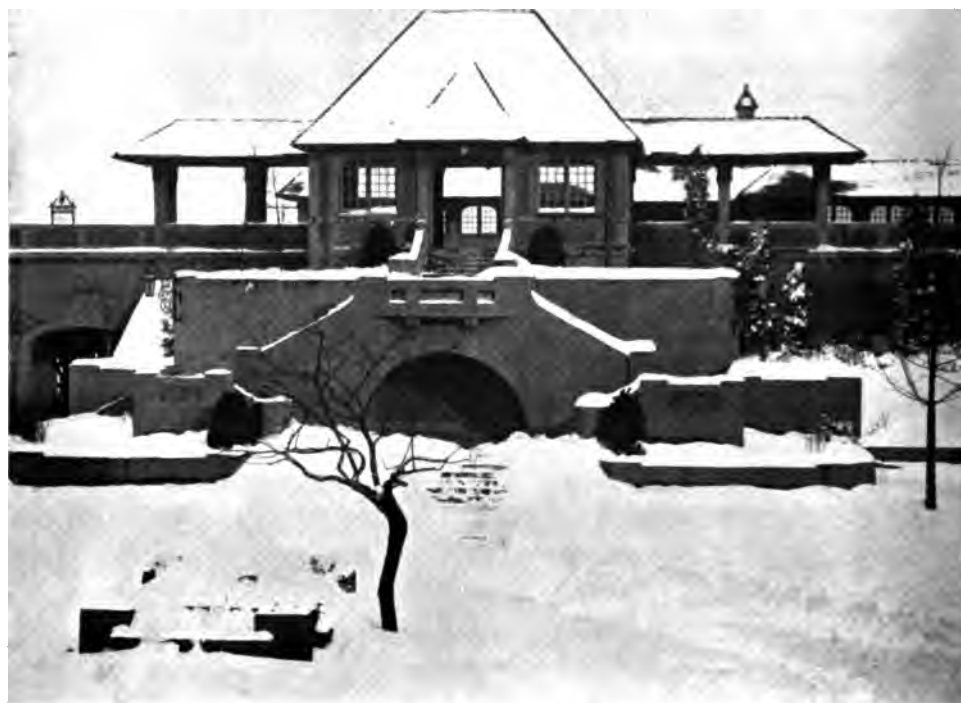
THE PERFECTION OF DETAIL AND PROPORTION APPEALED TO THE DESIGNER AS WELL, AS THE MATERIALS WITH WHICH TO OUTLINE SUCH PROPORTION.

units, namely, the introduction of grouting or filling with liquid concrete. Just as the cores must be vertical in the process of manufacture to allow the fire to take its characteristic vertical course, so the cores must be vertical in construction work to let the liquid concrete take its characteristic downward flow. This grouting makes it possible to count on the strength of every particle of tile. It is, of course, necessary to design the webs so that when blocks are placed one upon another with the joints broken, the webs and cores will correspond and the vertical channels be uninterrupted. I have noted the value of the air-space in the hollow wall as a non-conductor of changes in temperature, in other words, its furring value. Now, it would seem that I am advocating the destruction of this furring in order to obtain greater structural strength, but it is easy to retain both in the same wall, although in general practice, the advocates of each are apt to neglect or omit the other. It is quite practicable to design a block, some of whose cells, either on the inner or outer side of the wall, shall be grouted and the remaining cells left open for furring. Since the floor loads are more easily applied to the inner than to the outer surface of the wall, the furring space may better be designed for the outer surface of the block. Where the construction is a bonding wall, as in Texture-Tile, the Texture-Tile block forms an ideal furring for a grouted backing. Texture-Tile, where the cores are horizontal, forms a better insulation than vertical cores, the air in which is apt to be in circulation, owing to the opportunities offered to the heated air to rise in the vertical chambers and its physical tendency to do so. The bonding course can readily be designed to tie in with the grouted backing. In designing a block for vertical grouting it is well to make a double web in the center to provide a bearing for the webs above with an allowance for the joints between the blocks.

Permanent hollow-tile forms for concrete offer the additional advantage of a positive surface for plaster and stucco. In the case of floors they give depth to the beam, lightness to the construction and strength to the actual structure. As lintel and girder forms they permit speedy work in erection and in the case of the wall-

girder may be built on before the concrete is set. The strength of the pier may be increased by grouting without wasting material on the curtain walls, or piers may be dispensed with and a wall of uniform thickness, but of varying bearing capacity be readily produced. Also adequate furring spaces may be retained. All this may be done—strong, light floors, quickly erected girders and lintels, powerful piers, sure plastering surfaces—and in the end the finished product will stand the final test of economy.





POSTER ARCHITECTURE.



WINTER AT 1

1900



GARDENS.



SNOW TESTS THE COMPOSITION.

CHAPTER VII

Building the Other Man's House.

WHEN you build to sell to another man the temptation surely is to spend all the money where he can see it.

Yet that hidden value is sometimes the part of wisdom has been shown in many successful and at least one famous case.

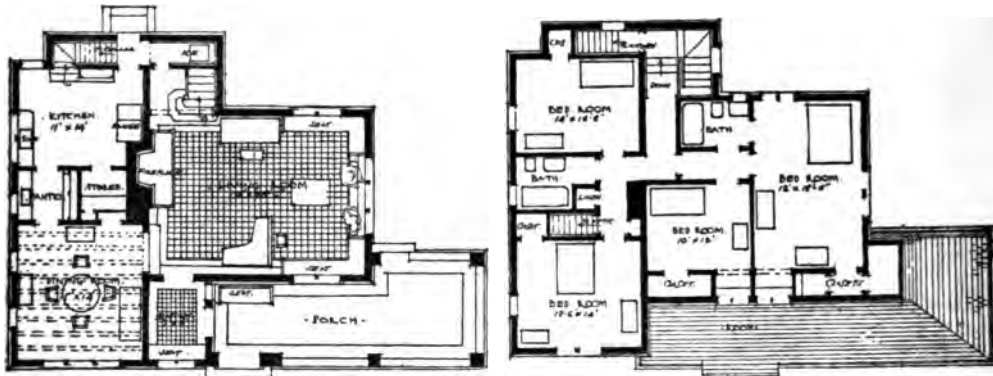
The reason a new firm in London has such hard sledding at the start is that the old firms have established a reputation for giving value seen not on the day of purchase, but years later when shoddy would have shown. They give hidden value. It is too true that Americans do not try so hard to keep long-satisfied customers. It is also true that the gay tinder box is more often seen among our real estate offerings than the simpler fireproof structure. These wooden houses, like some of their habitants, are content with a short life and a merry one. To be gay rather than safe, to be great rather than good are the axioms of the average real estate agent. Let me show you a few houses wherein there is hidden value.

The Fireproof Village in New Jersey is the work of a man who has been a decade before his time in many lines of thought. The Black Forest house, seen on page 105, is built in a way its second owner would never have had the experience or courage to attempt. Concrete floors, concrete stairs, tile side walls, asbestos roof, every one costs more than its usual substitute, and no one of them would add a dollar to many a buyer's offer. Forgotten would be the fact that this house will be permanent when its substitute will have perished. Forgotten is its fire protection, safe-guarding the family day and night. But not by all forgotten, for many an American knows gold from dross wherever he sees it, and the gold of the permanent home is not unknown coin in every investor's currency.

The gabled house is another of this group to which a similar description applies, but I will remark it only in passing, as it will have its quota of comment elsewhere.

To set the pace on a beautiful tract overlooking Branch Brook Park, the Clark houses were erected. Concrete combined with steel rods for beams, tile for walls and floors, slate for roofs—how little it reads like the average speculation. How little the pictures look like the flaunting fronts of competing clapboard castles. The present owners are the kind of men who buy government bonds.

The buildings at Forest Hills Gardens are built of hollow-tile, and this group so broadly conceived and well designed, has stamped



THE PLANS OF THE ENGLISH FIREPROOF HOUSE.

the material with the approval of the Court of High Decision. When from its safe haven, I look over the financial wrecks which strewn the first-discovered shores of house-fireproofing, I see that it is really the forgotten grave-stones of lost fortunes which have become the cornerstones of this Foundation, a foundation upon which will be reared all over America better structures than she has known. The Sage Foundation will become not only at Forest Hills but country wide, a strong foundation for homes of honesty and permanence as well as character and charm. With this in mind I bid you drink a silent toast to those who sought this shore as well as those who found its haven.



MR. PAGE BUILT FOR SALE A "BLACK FOREST HOUSE" AT MOUNTAIN STATION, N. J.



Squires & Wyckoff, Architects.

AN ENGLISH HOUSE WAS ITS FIREPROOF NEIGHBOR.



Squires & Wynkoop, Architects.

MR. J. WM. CLARK STARTED HIS REAL ESTATE TRANSACTIONS AT NEWARK WITH FIREPROOF HOUSES. IN THEM WERE SOLVED MANY OF THE EARLIER STRUCTURAL DIFFICULTIES.



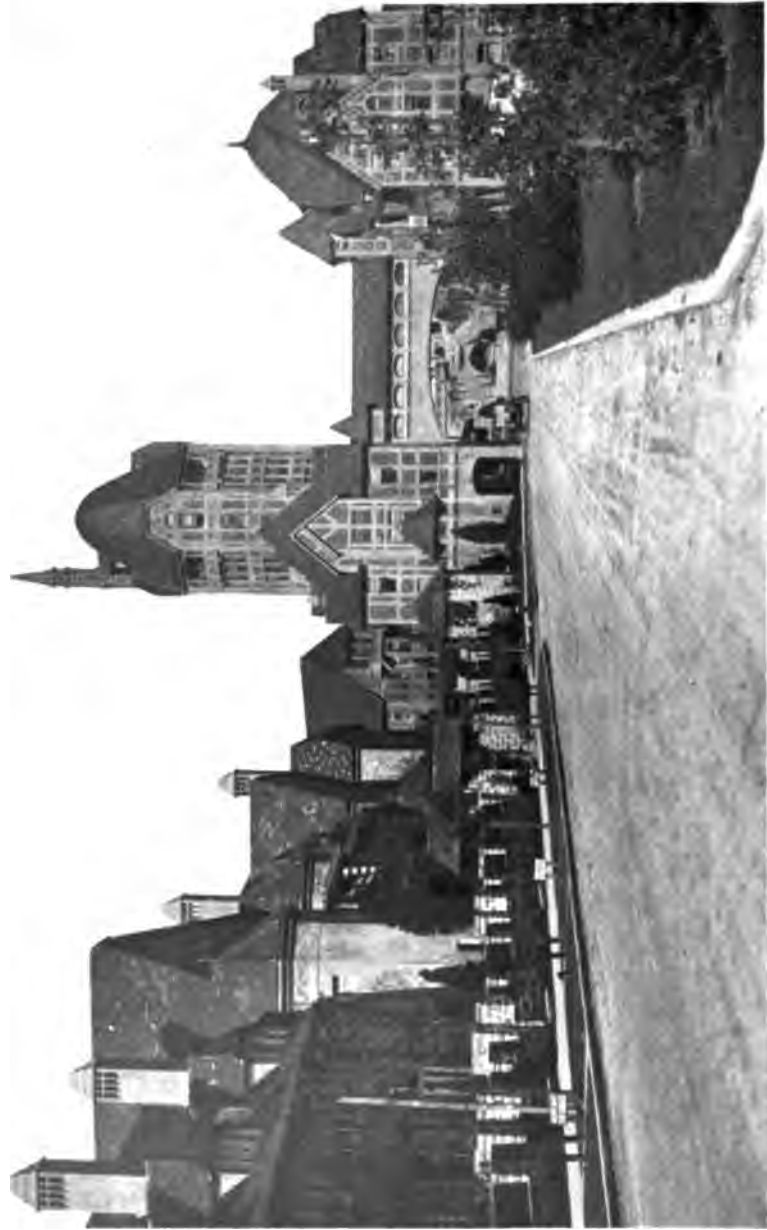
Aymar Embury II, Architect.

A COMPOSITION OF MUTUAL ADVANTAGES AT FOREST HILLS GARDENS.



Albro & Lindeberg, Architects.

THIS IS A MOST STRIKING EXAMPLE OF WHAT MAY BE DONE BY COMBINING THE INTERESTS OF SEVERAL OWNERS.



FOREST HILLS GARDENS. THE FINAL STAMP OF APPROVAL ON HOLLOW-TILE HOUSE BUILDING.
Gilchrist & Atchley, Architects.

CHAPTER VIII

Floor Building.

TRADITIONS stick, and a new material is often used for a long time in very much the same way as was the material which it has superseded. It is therefore not surprising that when concrete took the place of wood for floor construction, concrete beams followed wooden images.

I am showing, as my first illustration, the form of concrete floor construction now most generally used. This is an advance over flat slabs of concrete which are neither so light nor cheap. The beam is more economical than the slab because the strength of a concrete beam depends on its depth, and for this reason the same quantity of concrete and reinforcement, divided into separate parallel beams connected by a thin top slab, will carry a far greater load than an equal amount in a solid slab, which is really a series of contiguous, shallow beams. Furthermore, because they cross-bridge each other, the same quantity of concrete in beams crossing at right angles, will carry more of a load than an equal amount in parallel beams. A beam is a better way of distributing concrete than a slab because of concrete's peculiar combination of strength and weakness. The forces of compression and tension in a working beam are equal, and concrete has great power to resist destruction by compression, but little or no strength in tension, for which reason it must be provided with steel where subjected to tension, in order to make it efficient. Now, the space occupied by sufficient compressive concrete to balance the tensile steel is as one-hundred-to-one, and as the compression occurs in the top and the tension in the bottom, a rightly sectioned beam is a very top-heavy affair. Above the neutral axis concrete is providing compressive strength, which it is physically best qualified to do; but concrete in the ten-

sion zone is quite unfitted for any job except the light labor of tying the steel tension rod into double harness with the compression concrete.

It will thus be seen that in a solid slab there is a great amount of idle concrete which is reduced in the beam method by the amount of the voids between them. An ideal design would provide just enough concrete in the lower half to properly cover the steel and sufficiently fireproof it, which is a far cry from the waste which occurs in slab construction. Of course the slab on top of the beams is concrete strictly on its job, doing good compressive work. As I have said, this condition is due to the fact that, in the balancing of the equal and opposed compression and tension forces, it takes one hundred volumes of compressive concrete to take care of one volume of tensile steel.

There are two ways of making crossing concrete beams, described in the next few pages. The first is to produce them by removable moulds and the second by permanent forms. Under the first I will describe sand-moulding, under the second show how T and V-sectioned beams are formed by tile blocks and then how a plaster ceiling may be used for forms.

SAND MOULDS.

AXIOMS of architectural design unchanged since Roman times are combined in sand-moulding with engineering principles new as the use of reinforced concrete. The coffer found expression as an architectural principle in Roman ceilings, and still exists in our best work. This span of time is tellingly illustrated in the ceilings of the old Basilica of St. Paul at Rome, and the newly finished New York Post Office.

Much effort has been directed toward obtaining flat ceilings for plastering. Either tile blocks are required, or when plastering is to go directly on concrete, the aggregate for the concrete must be cinders, a very questionable material for constructive purposes. That such indirect methods should be used in the interests of

plaster presupposes it to be the most desirable material for ceiling-covering, and such was the case up to a recent date, but it is no longer true, because concrete has been so far beautified that its appearance is now better than plaster. Compare a plaster cast with its duplicate in concrete. The plaster is cold and cheap and lacks the color, the texture, the solidity which belongs to the concrete image. Architects have gone so far as to leave off the smooth finishing coat of plaster and roughen the final coat by mixing it with sand in order to avoid its staring, dead-white surface. When not so roughened, plaster must be tinted to make it presentable.

When the question of elaborating the six surfaces of a room is considered, it is always the ceiling which receives the most attention. This is true alike in the public building—as witness the ceilings of the New York Public Library and the waiting-room of the Pennsylvania station—and in the city and the country house. It is an accepted principle of design and decoration. The designer of the public work may execute his ceiling in stone, the city mansion designer in moulded plaster or carved wood and color, and the country-house architect in moulded wood, but each in his own way puts the greatest emphasis of his interior on its ceiling.

With the discovery of light-colored cements, concrete advanced rapidly in beauty. Since it is a combination of stone with cement and sand, it is easy to retain the natural beauty of stones by using them in the mixture. Reproductions in concrete of marble statuary are results obtained every day. The difference in cost and the similarity in result between pouring a liquid into a mould, and chiseling the same form out of rock, is to the disadvantage of the graven image. Lovely colors are obtained and the exposed surface is dull, and so may display soft tones. Thus concrete—a material which is part stone, and which may reproduce their beautiful colors, and which gives its best structural results in coffered forms—is the partner to sand moulds in this discussion.

This invention of mine involves the elaboration of the ceiling and the casting of the constructive floor in the same operation. It is the placing of temporary forms of moulding material on wooden

centering, the placing of reinforcement in both directions in the spaces between the moulds and the concreting around and over these forms and the subsequent removal of all the temporary work, including the sand, leaving the completed concrete ceiling in the inverse image of the moulds. In the plasticity of moulding sand, the consecutive fluid and solid nature of concrete, and the wide range of beautiful stones which may constitute it, rest the possibilities of the scheme. One can divide the ceiling into myriad forms, practically kaleidoscopic. Add to this that the method welcomes all compressive forms, such as the classic dome and Gothic vault, and the possibilities multiply.

There is a wide range of aggregates, marble, limestone, granite, quartz—Nature's rough jewelry—which may be used to make up the concrete itself, and it may be covered with applied ornament by insertion into moulding sand mosaics of glass or tile which will be held and displayed in the finished ceiling. Architectural forms like the rosette may be cast separately and inserted into the moulds and so arranged as to bond in with the slab after the removal of the sand. The forms may be sprayed with a liquid mixture of cement and any sparkling material such as broken glass, and a shell of it formed over the moulds which will be the visible part of the slab when the forms are removed.

Another way to enrich them is by blowing upon the dampened ceiling a mixture of cement and color, which becomes literally a part of it. Colors may be applied directly to the top of the moulds by pouring a film of the liquid coloring material and cement upon them, and allowing it to set a little before the commoner materials of the bulk of the slab are poured. The obvious method of forming panels of cement or plaster and using them as permanent forms has been tried, but lacks the fascination of the fluid and has some physical disadvantages beside.

Rather than bewilder you with a thousand suggestions for its application, I will explain the process itself by means of photographs and leave it to you to realize how wonderful are its opportunities.



ST. PAUL'S, AT ROME.



McKim, Mead & White, Architects.

A CEILING IN THE NEW GENERAL POST OFFICE FOR NEW YORK CITY.

For over a year I tried experiments in moulding materials before I settled on moulding-sand as the best. Clay gave results, but had to be covered with paper in order to keep its outlines under the softening influence of the wet concrete. Plaster was next considered and abandoned because its undercutting did not readily release from the concrete. The moulding-sand method proved best and is shown in these pictures.

I devised it while watching children playing on the beach. They grooved the hard sand in a gridiron pattern with their hoes and it struck me that these mounds were strong enough to receive concrete without losing shape. After experiments with beach sand, and observation of the iron-moulders, the idea of highly decorated sand-moulded ceilings became a conviction. After a winter of experiments, the first floor was modeled and poured, and the following photographs were taken during the process. The matrix shown in Figures 8 and 9 was made from the same design as the one used for obtaining plaster forms for a previous experiment. It is a positive, made of plaster reinforced with cloth to the exact size of the coffer to the center of the beam all round, with projections on two sides for handles. Where less decoration is required the matrix is wood-and-plaster combined. The cheapest matrix is illustrated here with photographs of a wooden one, empty, sand filled and covered with a palette—Figures 10, 11, and 12. The process of making sand moulds from the matrix is simple. The matrix is set on two parallel two-by-four studs laid on the floor and the dampened moulding-sand is heaped into it with a shovel and tamped hard by gentle blows from a sand-bag shown in Figure 9. When full, the top is leveled with a straight edge and covered with a wooden palette made just the size of the matrix. The moulder overturns the two, setting the palette on the two-by-fours and freeing the matrix from the sand by a rap with the sand bag. Then the matrix is lifted and the palette with its sand-mould is set on the temporary centering ready for concreting as is illustrated by Figure 13.

Figure 14 shows the reinforcement laid in place in the channels between the moulds; the plank pouring platform and the ladders

on which the concrete is raised, are also shown. Part of the concrete is seen already poured at the extreme left of the picture, Figure 15.

Figure 16 shows the concrete mounting up along the sides of the sand moulds and has completely covered some of them. None of the moulds were injured by the concrete, which was poured from pails, and the only special care taken was in directing the stream along the beams and not directly upon the top of the sand moulds.

Panels of ceilings done in sixteen inch coffers from the elaborate plaster matrix are shown in Figure 17, and Figure 18 shows the result when the sand-moulds were made from a simple, wooden matrix. A metal matrix in bold relief would produce sharper results than any I have shown. Sand moulding is most engrossing and opens a new field in design for every thoughtful architect. It will tend to greater freedom and originality in the application of ornament because of the ease with which it can be modeled and the delightful texture of the sand finished surface.

THE T-BEAM.

AN inventor of airships was recently heard to say that if he ever had to give up his contests with the birds, he would concentrate on concrete. The greatest of all inventors has often turned aside from electrical research for the delight of delving into the far-seen, measureless possibilities of stone-creating. It is significant that its call has been heard by these men of might, for it shows that in the conquest of concrete is the breeding of giants. Though its study absorbs great minds, concrete itself is but a homely thing, and it is not with the thought of an Edison but with the brains of a builder that this chapter most concerns itself.

I will now describe the floors made with permanent fillers and will begin with a combination of tile blocks which produces crossing T-shaped concrete beams.

The builder had been thinking while he poured concrete, and devised a beam sectioned like a T by means of parallel rows of tile blocks which were themselves on their closed sides inverted Ts. He



FIG. 10. THE WOODEN MATRIX.



FIG. 11. THE WOODEN MATRIX, SAND-FILLED.



FIG. 8. THE PLASTER MATRIX.



FIG. 12. THE WOODEN MATRIX, WITH THE PALETTE COVERING IT.



FIG. 9. TAMPING THE SAND INTO PLACE IN THE PLASTER MATRIX.



FIG. 13. THE SAND MOULDS WITH THEIR PALETES SET ON TEMPORARY CENTERINGS.



FIG. 14. THE REINFORCING BARS PLACED BETWEEN THE SAND MOULDS.

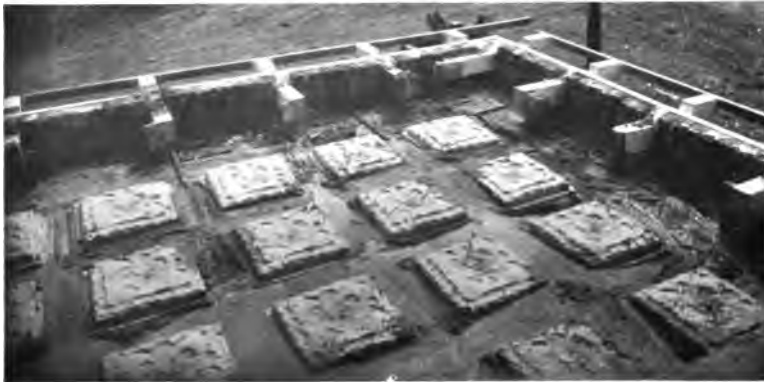
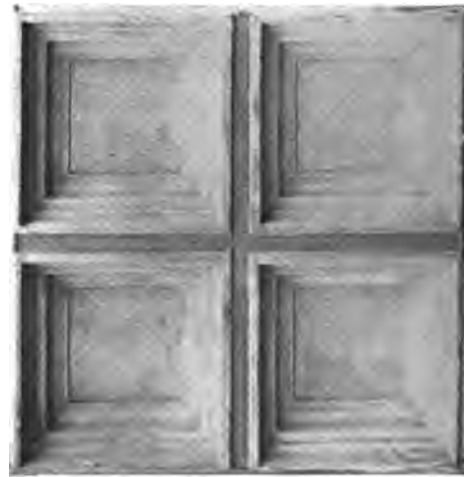


FIG. 15. THE CONCRETE PARTLY POURED.



FIG. 16. THE FLUID CONCRETE IS POURED BETWEEN THE SAND MOULDS AND RISES AND FLOWS OVER THEM.



FIGS. 17 AND 18. CONCRETE CEILINGS CAST OVER SAND MOULDS.



THE CONSTRUCTION OF THE GROUTED WALL.

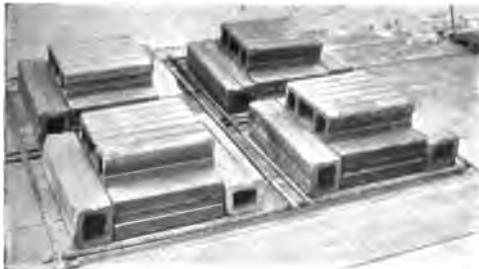


FIG. 19. THE BLOCKS ASSEMBLED FOR THE TWO-WAY T-BEAM CONSTRUCTION



FIG. 20 THE CONCRETING WITH AND WITHOUT TOP SLAB, SHOWING DOUBLE AND SINGLE T-SECTIONS.

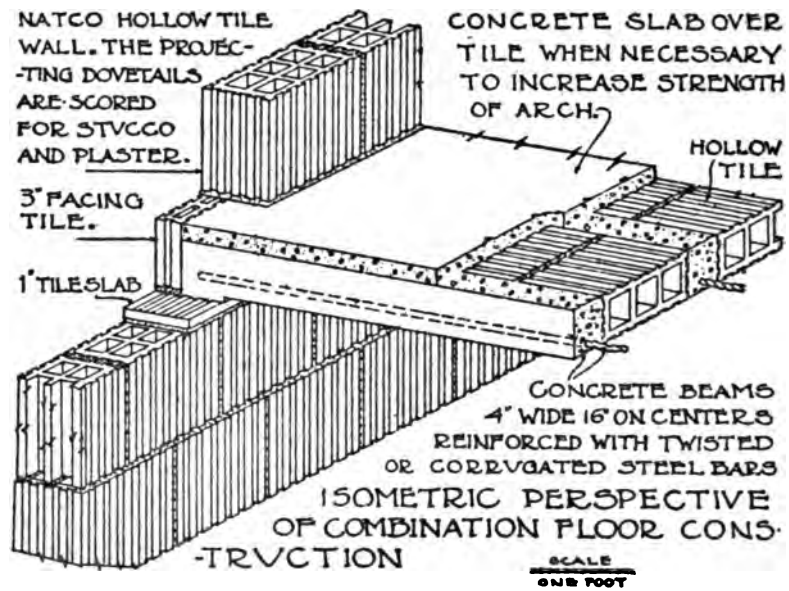
worked this out first for parallel beams and adapted it later to crossing beams, and I have noted these as its most obvious good qualities. The T-shape is a good section for a concrete beam, be it one-way or two-ways, because it puts the emphasis where it belongs. A T-section provides a mass of compressive concrete where concrete is needed and cuts down tensile concrete because it has little value.

Mr. Vought's block is an inverted T on the closed sides, and the same section is provided on the other sides by placing loose members similar to the flange of the T along the lower halves of the open sides of the block. See Figure 19. When the beams are poured, the concrete comes into permanent contact all around the top of the block in the compression area, even entering the open ends. There are no dry tile joints to reduce the value of the compression. Dry joints occur, it is true, in the lower part, but here they do no harm, for the tile and concrete are subjected to tension only, and such force is amply taken by the steel. A glance at Figure 20 shows all concrete excluded from the open ends below the neutral axis by the fillers where it would be a dead load and allowed to run into the open ends above the neutral axis, where it solidifies the compressive section. This scheme of closing the right part of the open ends of the block is a recommendation. It is noteworthy also that the method is developed so that it does not require tight centering.

It is seen, then, that the T beam presents the advantages of a section which is in conformity to the physical strength and weakness of concrete, that it makes the tile do actual work in the slab, induces concrete into the compressive and excludes it from the tension part, permits open centering and produces an all-tile ceiling for plastering. Not such a bad showing for a builder's invention!

The Corr-tile floor is shown in Figure 21. A rectangular tile with flanges on its closed sides is used in connection with channels placed along its open ends to form repeatable square fillers, making, when assembled, forms for crossed concrete beams between them. It has many manifest advantages, not the least of which is the all-tile ceiling produced thereby.

This construction is the result of a process of elimination and



DETAIL OF WALL CONSTRUCTION OF NATCO HOLLOW TILE WITH FIREPROOF FLOOR OF HOLLOW TILE AND REINFORCED CONCRETE BEAMS. THIS FLOOR CAN BE CARRIED SAFELY OVER VERY LONG SPANS.

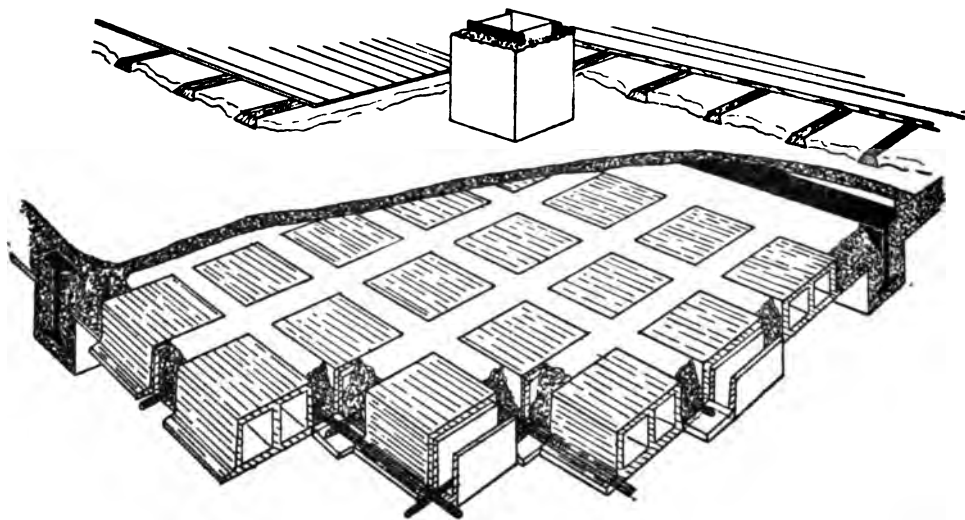


FIG. 21. CORR-TILE CONSTRUCTION.



FIG. 22. THE EXPERIMENT WITH ONE-INCH STONE.



FIG. 23. THE RESULT WITH FINE GRAVEL.



THE STRENGTH OF THE CONCRETE BOND BETWEEN
BEVELED BLOCKS.

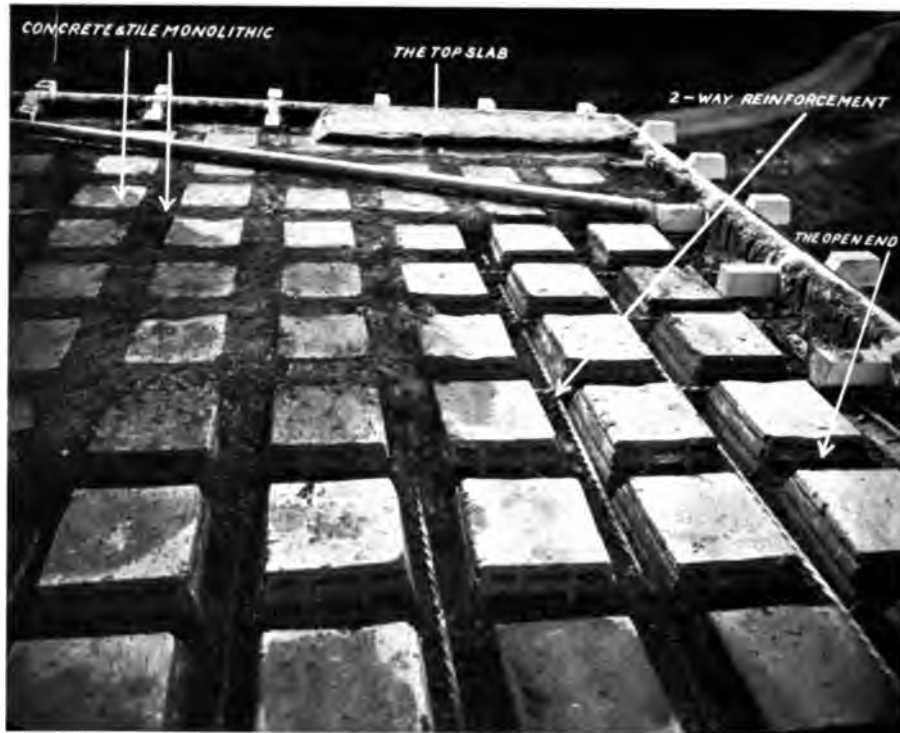


FIG. 24. THE BEVELED BLOCKS PARTLY CONCRETED.



FIG. 25. THE CONTACT ALL ALONG THE BOTTOM MAKES EACH BLOCK IMMOVABLE AND PRESENTS AN ALL-TILE CEILING.

development and has stood the test of use. Many of the newer New Jersey schools owe their fireproof quality to Corr-tile. Its predecessors were the Faber system and another only slightly less successful product of the same inventor, a prolific originator named Ferdinand Burchartz. Too much praise cannot be given to this system and the impressive energy of those who have fought its battles to a successful outcome.

THE BEVELED BLOCK.

THE next scheme to be considered is the two-way floor formed with beveled blocks. It is a construction of single tile units which are beveled on all sides so that they may be placed with their lower edges in contact and thus form between adjacent blocks crossing V-shaped channels as containers for reinforcement and moulds for concrete beams. I will show this block in process of manufacture as well as its use in the floor, and will demonstrate that it is a stock product no more complicated than the common rectangular block.

The idea of beveled blocks to contain between them intersecting V-beams, came to me after a talk with Mr. Asher Atkinson as to the ideal section of a concrete beam for such work. This, he said, should be above the neutral axis almost a parabolic curve. Up to that time, hollow tile had been a successful form medium, but no combination of blocks had ever approached a parabolic curve, because of the many and strenuous difficulties in departing from the angular in tile manufacture. The parabolic curve could only be approached by a form made up of straight lines. I had a general knowledge of accepted forms of tile-and-concrete floor construction and of the ingenious, but often complicated, methods in use to provide tile containers for beams. The problem did not seem to be solved because of the difference between the theory and the practice.


Now entered chance. I had designed a bottling house in Amsterdam, the owner of which was a very knowing kind of man by whom the superintendence of an architect was not considered

necessary. (This kind of a man is familiar to every architect who reads these pages.) The floor construction of his bottling-house was the common, one-way, tile-and-concrete beam method, and it was not mentioned in the specification, as being too obvious, that the tile in the rows forming the confines of the beams should touch each other on their open ends and should present their closed sides to the concrete. The client, not knowing the accepted practice, and feeling that the concrete would not bind the tile in place strongly enough in this way, decided to set the tile with the open ends to the concrete. He then proceeded to pour his beams and slabs.

Some time later I had occasion to be in Amsterdam and saw the position of the tile in the unplastered basement ceiling of the completed building. I called my client's attention to the fact that he had a considerable dead load of concrete in the open ends of the tile. This he denied. "You can't make half-inch stone float, and the cement and sand won't leave it." His observation was that the concrete had not run far into the open ends of the tile—in his own words, "Just enough to hold the blocks in place."

There had been piping suspended from the basement ceiling by means of puncturing the middle of the bottom web of the tile block and hanging wires from nails laid in the tile above the bottom web and across these small openings. At such places it was possible to measure the exact distance to which the concrete had run into the open ends, and investigation proved that the owner was right. The suction of the porous tile had impeded the flow of concrete so that it had run into the block but little at each end, leaving the middle of the tile untouched and dry as a bone. From observation of this error of a novice client and contractor and linking it with the advice of Atkinson about the ideal section of a concrete beam, came the conception of an open-ended beveled block as solving the problem.

Some of the difficulties in the way of the beveled block are laughable now that they have been overcome. A prominent floor-designer, consulted during the theoretical stage, said that a tile so shaped could not be manufactured. So set was he in this idea that even when he sees the photographs of it, he will say, like the



farmer who went to a circus and saw a giraffe for the first time, "It ain't possible! There ain't no such critter!" A tile manufacturer said that you couldn't pile them on end in a kiln. The scheme of reversing the faces as shown in Figure 9, had never occurred to him.

A "doubting Thomas" is one of our sincerest citizens. "I'm from Missouri and you've got to show me," is one of the best sentiments in the world if it isn't uttered by the farmer who saw the giraffe. The things I have had to show have been that the suction of the block checks the concrete, that the rod is abundantly surrounded with concrete and the beam section itself follows engineering principles. It is self-evident and need not be shown even to those from Missouri that the scheme of setting repetitions of a single symetric unit is simple, that it puts the top of the block in compression, and furnishes an all-tile ceiling.

When the block came on the job the principal question was in how far the concrete would enter the open ends, and in order to satisfy ourselves on this point we made a number of interesting and conclusive experiments shown in the accompanying photographs. Several of the blocks were sawed in half from open end to open end and put in their regular position in a small section of floor, a board was sawed to the slope of the sides of the adjacent blocks and fitted up close to the cut block. Concrete was then poured into the channels, as shown in Figure 22, and after it had set the board was removed. Two experiments were tried, one with one-inch stone concrete and the other with the finest gravel concrete. After the boards were removed pictures were taken as indicated in Figures 22 and 23. The concrete of one-inch stone had hardly entered at all, and the concrete of fine gravel had worked in less than enough to form a square beam. I know of no better test, or more scientific, that could have been applied to settle this critical point. The openings may be entirely closed with sand if this refinement is desired.

After these experiments were successfully concluded, the floor slab shown in Figures 24 and 25 was poured with cinder concrete. You will note that the photographs were taken to show two methods

of construction, one in which the concrete is not intended to go above the tops of the blocks, the tile itself taking its place in compression, and giving a result which would be sufficient for moderate spans and loads. A concrete top slab is shown in the corner of one illustration, a method which would be used with longer spans and heavier loads.

In this description of a new use of tile in floors, I feel quite sure that I have interested you with the pictures and I hope I have interested you by showing how advances in building progress sometimes come. One man may know but one thing well, as the tile manufacturer expertly knows his tile, and another man may know another thing well, as Mr. Atkinson knows his engineering. Once in a while a third man who doesn't know nearly as much about either subject as its own specialist gets a chance to talk to each and welds the triple information into an invention.

THE PLASTER BLOCK.

I HAD been impressed while looking over various schemes for providing forms for crosswise reinforcement, that the problem had been approached almost entirely from the point of view of deriving a two-way system from some well-known one-way scheme. This was especially noticeable in hollow tile, whose manufacture required that each block must be open on two sides so that the two-way adaptations were practically inventions in closing the open ends. Searching around for a material which should not have such limitations, I ran across the sand moulding process, a description of which has just appeared in these pages, and while experimenting with it I went through the whole range of moulding materials, and in this way became acquainted with gypsum, from which the plaster block is made. I found immediately that it was subject to none of the limitations as a form for crosswise reinforcement that are inherent in hollow-tile.

Having thrown away tradition and having found a material which could take a closed form on all sides, it then seemed timely to



FIG. 26. THE TEN DOLLAR FACTORY.



FIG. 27. THE SLOTTED PLASTER BLOCK.

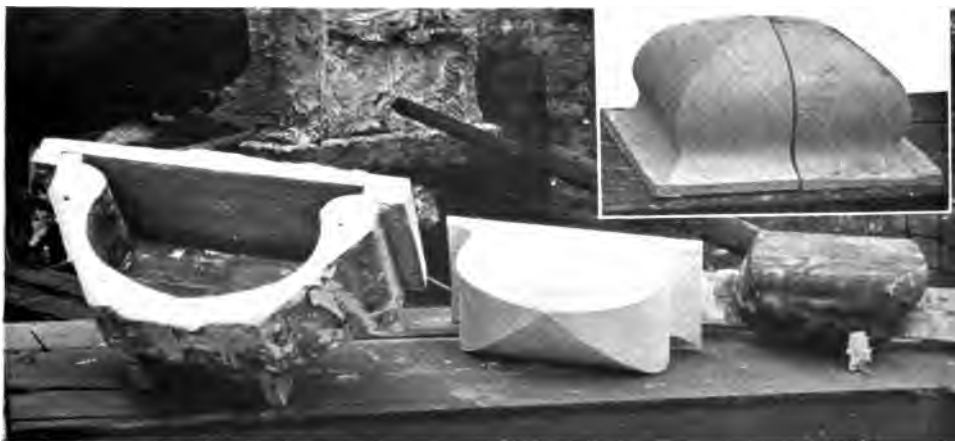


FIG. 28. CASTING THE HOLLOW PLASTER BLOCK IN HALVES.



FIG 29. MAKING A HOLLOW PLASTER BLOCK BY CASTING THE DOME IN ONE PIECE AND PUDDLING THE BOTTOM IN.

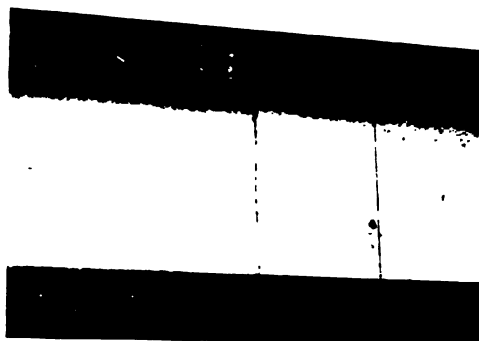


FIG 31. CLOSED BOTTOMED PLASTER BLOCKS ON THE FORMS.



FIG 30. A TELLING ILLUSTRATION OF ECONOMY IN FORM WORK. THIS SHOWS THE UNDERSIDE OF THE SLOTTED PLASTER BLOCKS.

work, no longer on the material of the forms, but on the ideal shape into which to mould the concrete. I was confident that this would not be the outline shown in existing two-way tile or iron form systems, which would unquestionably be limited by the rigid make of the materials. It seemed obvious also that the outline of the concrete beam, with its one per cent. tension and ninety-nine per cent. compression volumes, could be nothing like the outline of a wooden or iron beam which is homogeneous, yet had been copied in the existing tile-schemes.

If I could once settle what this outline should be, I had at hand a plastic material which I could make conform to it and later as a mould produce a similar outline in the concrete itself. Mr. Asher Atkinson plotted the ideal outline of a concrete beam as a double parabolic curve starting at the neutral axis and rising on each side until it met the top slab. He modified this slightly to take a mean course between this curve and an ellipse having the same axes, so as to take care of concentrated loads. To simplify the idea and get clear of geometric terms, let us consider the beam to have curved sides instead of straight. This line is a far cry from anything that can be made up out of hollow-tile blocks but is perfectly easy to produce in gypsum.

Plaster is easily channeled on its lower surface for electric conduits and may be cut to fit around pipes, columns, or any other obstruction. Concrete does not affect it, nor yet did it cleave to it, so it seemed desirable to obtain a sure mechanical bond between the two. Each being a material that goes through consecutive fluid and solid states, such a mechanical bond was one of the simplest possible things to obtain.

Being convinced that there was a chance for a plaster block as a fireproof, permanent mould for concrete, there remained only the casting and building of it into an actual operation. I knew that plaster had been used as a mould for the most delicate kinds of ornamental concrete work, so I foresaw that there could be no difficulties arising from differences in the expansion or contraction of gypsum and concrete in a big slab. It was at Oakland, N. J.,

that the first opportunity came to use plaster blocks in a fireproof building. We shipped the material to the site and with it the blue print, from which a carpenter made the moulds shown in Figure 26. Four of these were made and they were all the machinery used. Two Italian laborers turned out, at the rate of a hundred and twenty a day, such blocks as are shown from top and bottom in Figure 27. You will note that the block far more nearly approaches the parabolic curve recommended by the engineer than any previous form. The mechanical bond is produced by an inward sweep near the bottom of a block at the point where the bar will come when the block is put on the form and serves the double purpose there of binding the block into the concrete slab and of surrounding the bar with a plentiful amount of concrete. It also shows the lath effect which may be readily plastered. In our later work, however, this block was made in halves, as shown in Figure 28, or made hollow and a bottom puddled in, as shown in Figure 29, and in both cases the block required only a white coat, after it had become a part of the ceiling. Figure 30 shows the form work and the blocks supported on it. You will notice that it is very open and obviously inexpensive. Figure 31 shows the closed blocks on the forms. Figure 32 shows the blocks on the forms and the rods in position. These blocks proved to be very strong and were not affected at all by stormy weather or the walking and trucking which took place on them. They were well aligned, the reason for which may be readily seen by glancing back at the blocks themselves. Since all the blocks were made in the same mould, they must necessarily be perfectly true on all their lower edges and surfaces, so that when they are put edge-to-edge on the form you cannot move one without moving all. For this reason the concreting was easy and sure. Figure 33 shows the concrete over the top, and the insert shows that the plaster holds nails, and I have cast floors in which the concrete was brought only up to the level of the top of the block and the rough floor nailed directly to it. This is possible, of course, only because of that other quality of the plaster block that it can be grooved on the under side for electric conduits. If it had been

necessary to put these conduits on the top of the slab it would also have been necessary to have provided sleepers and fill as in the usual construction. This feature of the material saved two or three inches in the thickness of the slab. After the forms were taken down, a plaster ceiling was presented by the blocks themselves, which was readily finished with a very thin coat.

The main advantage which appears in plaster block is cheapness, due to these reasons. First of all, the materials are shipped in bulk to the site, a very economical procedure, especially since every job requires plaster any way. Then the moulds are very simple and have a very low first cost, the working of gypsum is known to thousands of laborers, the pouring of the liquid gypsum into the mould and the opening of the mould and removing the block eight minutes later is a fool-proof operation. The fact that gypsum sets up quickly is the salvation of the whole scheme, as four moulds will keep two men busy, and two men can turn out, when pushed, a hundred and fifty a day. The type of labor that knows enough to go in when it rains has all the intelligence required.

The form work for the plaster consists only of three-by-fours at the junction of each row, supported in turn on two-by-tens about five feet on centers running in the opposite direction. The blocks line up so true that there is no waste of concrete through the joints, which makes for economy in that material. A ceiling such as shown in the photographs, and more particularly a ceiling where an entire gypsum surface is presented, is the most economical kind of a surface on which to plaster, for it is literally a rough plastered ceiling before the plastering is begun. An ornamental coffered ceiling of any degree of elaboration may be obtained by casting plaster blocks in an ornamental mould as is shown in Figure 14, but I have been an architect long enough to know that anything which aspires towards beauty is signing its own death warrant when it obtrudes itself into an engineering problem.

I am now at the goal for which I set out. I have a form which fits an engineering theory. To the best of my knowledge the beam produced by it is exactly what the engineer told me to produce. The

form is but a form. It takes a good explainer to get away with some of the other present-day forms. The plaster block starts with the theory of the outline of the concrete beam and modestly conforms thereto. Having done so, it must follow that the concrete is exactly where it belongs, in other words, that the minimum of concrete is doing the maximum of work.

I would say in closing that it has long been considered good engineering to reinforce a concrete slab by a series of parallel rods crossed by a second parallel series laid at right angles to the first in order to carry the load equitably to all the four supports, and it has long been known that such a slab could be improved by cutting out the idle concrete in the lower part. The forms to do this work had suffered much in efficiency on account of the physical limitations of the materials from which they were made, and it was not until the plaster block was developed that a permanent form was found which could perfectly section the resulting beams. One of the requirements was a flat plaster ceiling, and the plaster block is flat and it is plaster. It is easy to make and easy to use, and both in manufacture and construction spells "economy."



FIG. 32. THE REINFORCEMENT IN PLACE.



FIG. 33. THE NEARLY COMPLETED SLAB.



LEATHERSTOCKING FALLS.

CHAPTER IX

Tile in Stucco Surfaces.

THERE is hollow-tile and there is a kind of tile which is thin and flat, good for floors and the protection and embellishment of other surfaces. Since their names are so similar but their uses so divergent, lest there be confusion of tongues, I'll turn a little from my way to describe the use of decorative tile and then suggest a way to wed decorative to structural.

To the designer, tile offers opportunities in the enrichment of his buildings by form and color. In the present illustrations the design shows plainly and needs little more description; but color, not being visible, requires elaboration.

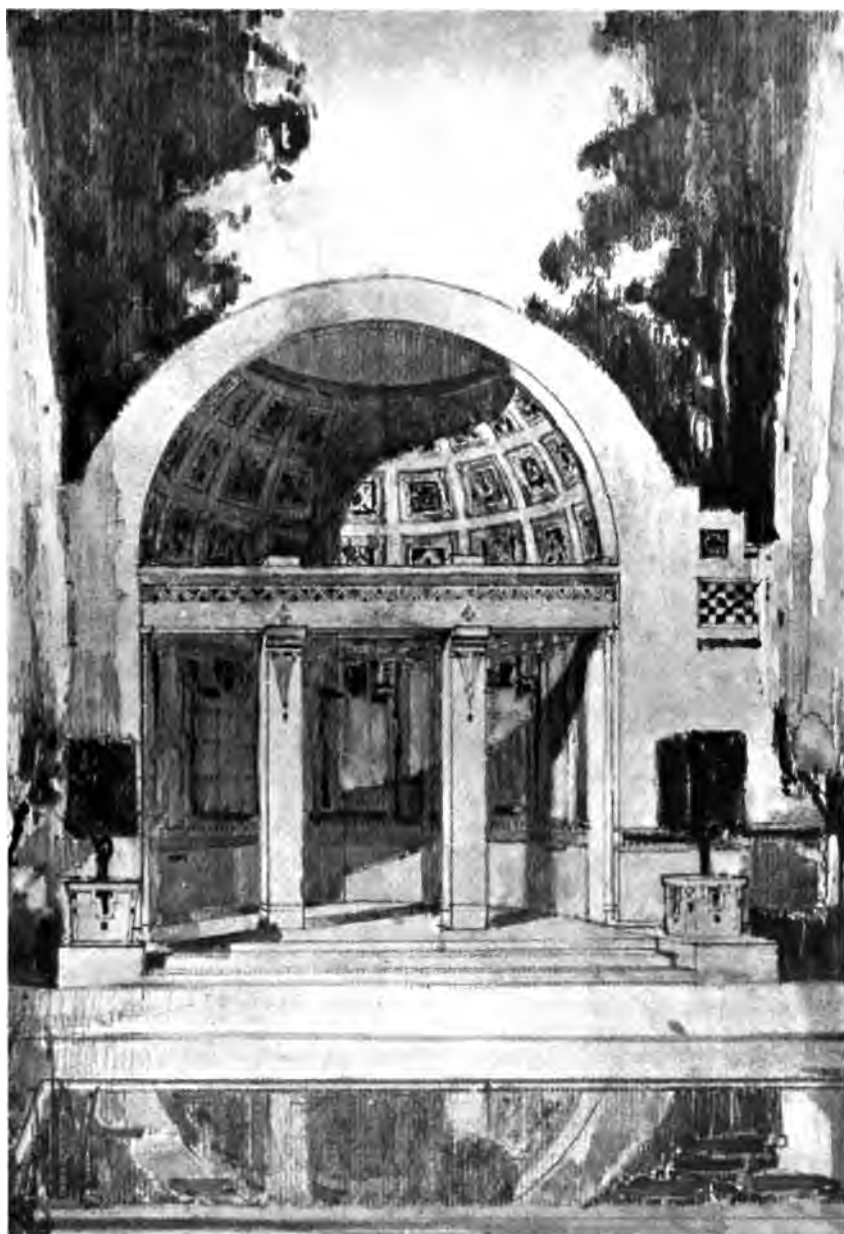
Tile works advantageously with a wide range of other things, but always as the decorative spot or band, a small part only of the surface. The growing popularity of brick work gives a wide field for tile design in its connection. It has been used effectively with marble, and its rich tones harmonize with the wood work and hangings of interiors. The growing popularity of cement covered buildings, due to their fireproofness, has introduced for their enrichment a new problem in design, one which is well solved by the application of tile to their exteriors, and it is about such applications that I have written this description.

A glance at the illustrations shows the general principles of tile design in stucco surfaces. Panels, band-courses and scattered patterns, covering a small percentage only of the surface, are the rule. Such parts of the severer forms as would be treated with carving under strict interpretation may be treated less formally in tile. It must be held in mind, however, that in the great majority of cases, this tile is of commercial size and color, and design with it is a matter of selection. That is to say, such elaborate archi-

tectural forms as coffers and rosettes must be avoided and flatter features used. Design becomes a matter of selection from obtainable forms and their proper combination with each other and with the surface of the building to be treated. This method of design, as well as the cement field-material itself, leads into a new realm of inventiveness and has already, and will continue to produce unusual results. To apply the principles just stated to the illustrations, it will be seen that the exedra and the bank are classic forms of which the usually decorated parts are treated, not with classic ornament, but tile. One would expect the inner surface of the half-dome to be coffered and decorated with rosettes, in a classic model, but the same general effect is produced by insertions made up of small flat tile. The cylindrical form below is paneled with flat inlay, at a distance recalling very nearly the effect that its classic designer would produce. What would have been a classic column becomes an ornamented pier, where the classic would require carved decoration. The bank portal, although executed in cement, is classic in its members, and here again the tile applies in just the places where the earlier artist would have used relief. Specially modeled forms have been introduced, such as might be expected in terra-cotta, and these designs may be produced in loveliest colors where their magnitude permits. More personal are the applications of tile to the entrance and upper treatment of the cement-covered house. A highly modeled water spout, interrupting a continuous band, marks the center of the entrance wall, which guards a double flight of steps leading to a doorway.

The lower stories of the city house are designed and decorated to produce charm without extreme originality. The circular-headed windows are merely surrounded with bands of tiny tile and between them are decorative spots of faience figures. The whole composition is in low relief and color.

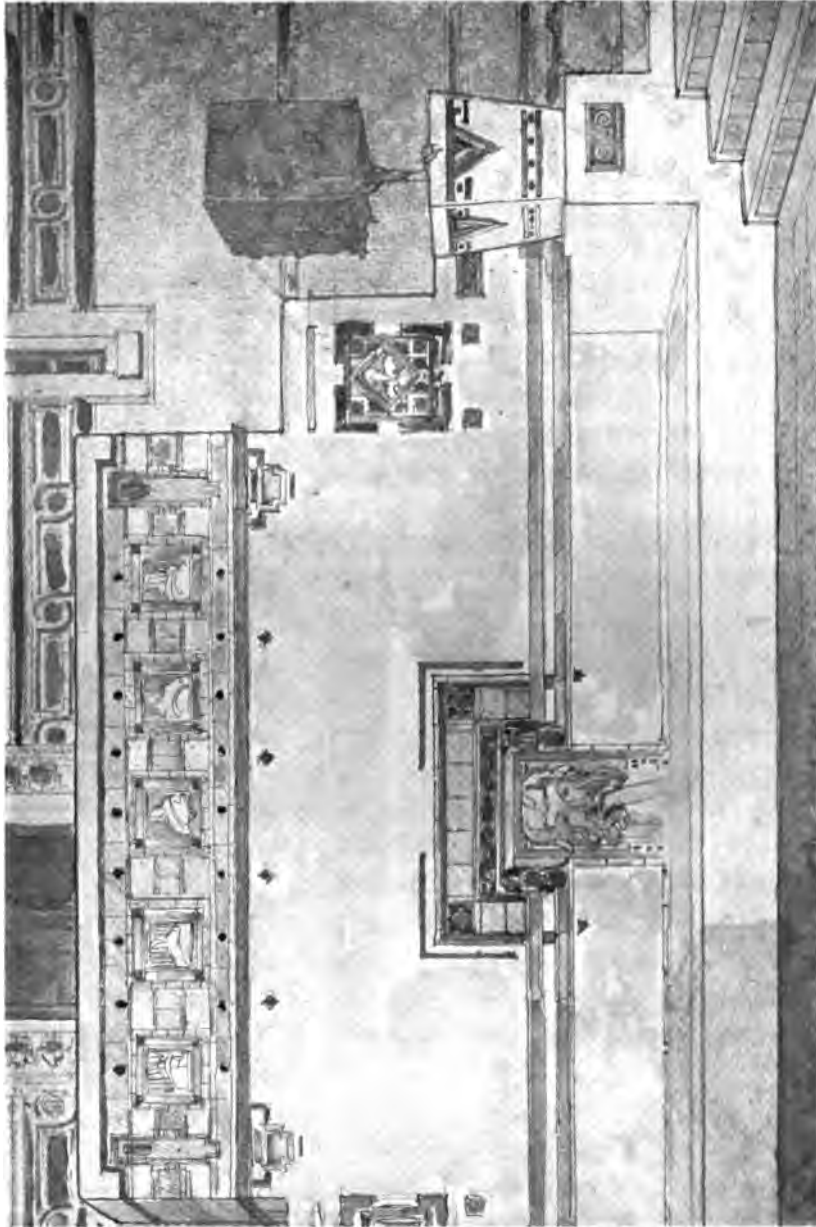
It may then be concluded that tile design may take the place of the usually decorated parts of classic composition, or on more personal and original conceptions, may properly occur in panels, bands and scattered ornaments.



TILE DECORATION OF AN EXEDRA.



TILE USED TO ORNAMENT SURFACES IN CLASSIC DESIGN.



TILE SET IN A STUCCO WALL.



TILE IN THE STUCCO SURFACES OF A CITY HOUSE

Among the lost arts, but soon to be revived, is color in our buildings. Because the light is less intense, color may be used more safely for interiors, but Capri and many other old world cities show that it is not amiss out-doors. We know that color is permissible in Spain and Italy and even as near home as Mexico, but on account of some subtle difference in our atmosphere we are warned that it may not be used at home. How may we reconcile with this negation, the beauty of our green fields and forests, our purple hills and autumn leaves? Who cavils at vine-covered churches or rose-bowered doorways? Surely bad taste in its application, rather than any quality of North American atmosphere, has hurt the fair name of native out-door coloring.

I think the difficulty is more in a matter of texture than color and that, as a fact, if sufficient roughness were introduced into the surfaces of our buildings they would stand a deal of proper coloring. It will be noticed in the brick work of today that the faces of the successful buildings are rough and that where this is done there is made possible ample color in the field itself, and brighter accents. In our chosen stucco, it is easy to get texture and even color. But the neutral gray of its natural surface makes the strongest cry for color decoration. It is a field in which colors find harmonious resting places. None are more rich and lovely than those of unglazed and mat-glazed tile, and none blend better with a stucco surface. You may ask why colored glazes are not applied to structural tile itself, and I will answer that this is being done. Next year may see charming mat glazed hollow tile structures.

In color there is always a far distant Grail for painter and designer, and the difficulty of attaining its perfection has discouraged many from its quest. There is, however, the safe middle-ground of the well tried, and here the designer may begin. He is aided by the generous hospitality of the grey stucco field for color, and if the number is kept small the task is far more safe and simple. With each success a little more may be attempted until at last a rich-toned building may take an honored place in the color harmony of nature.

CHAPTER X

Tricks of The Trade.

IF you are curious to account for the charm of the building shown in these photographs and plans, you may be willing to read this explanation of the methods by which it was accomplished. I have shown by the pictures the points which give it interest, and in the text I shall try to describe them.

The house is a fireproof building of hollow tile, part of whose interest in design is due to imagination and personal feeling for the right thing in composition, but while it is picturesque, much of its effect is due to certain broad architectural principles which apply to this and many another building and which I shall call "tricks of the trade."

The most obvious trick is the use of repetitions of a unit, for you will see that all the window sash are made up of equal panes of glass and the window groups themselves are made up of sash of equal size. The masonry opening is small, giving a sense of increased size to the whole building; for instinctively we judge the size of the general mass by the size of some part of it which is nearly constant, such as a window, a door or a step, and by minimizing these well-known measurements we can maximize the general mass. It is a trick like stage-perspective. Similarly, the size of the ground plan of a building is judged largely by comparison with its height, for plan sizes have no standard and cannot be mentally computed, while the story heights are nearly standard and quite obvious. In this house the standard has been reduced by keeping the general rooms very low, not over eight feet, thus making the building have the effect of exaggerated ground space, which is augmented by containing the porch under the main roof and setting the building itself low in the ground. The observer does not realize that all the heights have been reduced below the usual standard of comparison.



"THE WHOLE BAG OF TRICKS."



THE HOUSE IS BUILT AROUND THE TREE.

The porch increases this effect by the smallness of its entrance door, and the lowness of the solid rail. These give a sense of scale because such things have a well known relation to the size of the human figure. When the building has reached this stage in design, its impression of ample size is assured. The remaining tricks are additions to its charm.

It will be noticed that the ridges of all the gables intersect, so that from whatever point you see the building, it has a long roof line, a trick picked up in England, where it is quite generally practiced. The high chimney hails from England also. Its position was fixed by combining economy of plan and composition of exterior, and the plan and the picture show how well the single chimney fulfills its double mission.

The roof is the main feature of the house, and to accomplish its outline considerable adjustment in plan was required, and it is such ingenuity to shift a room to the point in plan where it will help the elevation without damaging its relation to the other rooms that marks the difference between the designer and the draftsman. Every house must have certain rooms, and each particular house must have particular rooms of almost fixed sizes and locations. Size, site and sun may not be gainsaid, but it is always possible to adjust the plan and elevation to the general advantage. In this house the dining room had its size and location fixed, and the living room must be of about a given size and on a given street. By advancing the dining-room for a gable and keeping the porch line flush with its front wall, it was possible to start the ridge of the gable over the living-room, level with the dining-room gable-ridge and bring its roof line over the porch. The center of the big gable is not over the center of the living-room, but no artistic difficulty is thereby experienced, owing to the way the window grouping is adjusted by centering the sash and not the masonry openings.

The groups of windows in the dining room gable are diminished in each higher story according to the needs of the plan as well as the best appearance of the exterior. A refinement in the window

frame will be noticed in that the woodwork forms a uniform band around each sash and becomes literally a frame.

When this house was built, not a tree was cut down. The big chestnut in the angle at the rear had much to do with the aspect of the plan, and now the red roof gets a tone-intensifying background of green leaves from every point of view. This question of site is a most important trick, for there is no use deluding oneself with an impossible paper presentment in one's office, when the problem is not a picture at all, but a real house on a real lot. Money can do much toward correcting the site to fit the house, but it is wiser to make the premises the premise.

One of the tricks of the trade is the proper use of materials. Here they were decreed to be fireproof hollow-tile and asbestos shingle, which present about the same problem in design as any masonry, stucco covered red roofed house, except that the roofing material is thin and the color more rosy than a red slate and this rose requires browner and rougher stucco than would be used with other reds. Also the fireproof nature of the house argues with no little logic for a minimum of wooden decoration. It was necessary then to get all the interest in the building by composition and by such tricks of the trade as I have just described.

It would seem natural, that, with all these schemes for accomplishing exterior interest, the plan would have been mutilated, but such is not the case. Turning to it, you will see a house with the plan reduced to its lowest terms and you might suppose that here the designer had freest hand. What strikes the eye immediately, is the generous living room with its floor below the general level of the house. But you may also notice that the plan is so arranged as to require but one chimney and one stair case branching to the kitchen. There is no hall downstairs and upstairs only enough for communication with the various rooms. The closets are found under the long slopes of the roof or under stairs. In the gables above are the servants' rooms and in the basement is the laundry. Instead of the waste and confusion which an English

plan for so much designed a house would show, one finds here only economy.

But it is in the rejuvenating of old buildings that one finds the best place to try the whole bag of tricks. The fact that the house of thirty years ago was seldom designed by an architect, but was well and soundly built by carpenter or mason, gives the redesigner a chance to be the wonder worker who gives new lamps for old. The carpenter's house, for very lack of attempt at any architectural design, was of simple form and outline, and this simplicity lends itself gracefully to modern adornment by skilled hands.

The reader readily recalls such types as the rectangular house with simple gabled roof and that very popular type of thirty years ago, the square house with a flat roof, yet lofty withal and surmounted by a cupola. "Let well enough alone", is the best rule for the true Colonial houses, work of craftsman carpenters. It was not until attempts were made to follow a complicated style, such as the mansard roof, that houses were built which were so complex as to be almost impossible to improve by redesign. It is then true that, on account of simplicity of construction, the builder's house of thirty years ago is nearest the fountain of perpetual youth.

The interior of an old house seldom presents any serious difficulties as its beauty is largely a question of tones of color, well chosen rugs and hangings, and good furniture. The plan, to be sure, may be improved by the removal of partitions and the addition of a new fireplace, more wood work and new floors but many a beautiful result is the work of a decorator availing himself of no change in plan whatever. It is on the exterior that the architect may work his magic, by changing outlines, colors, and natural surroundings, or, in bigger words, by redesigning, redecorating, and landscape gardening. The redesigner may improve the building by removing or covering its manifestly objectionable parts, by giving it scale and interesting outline with low additions and by bringing it into harmony with its surroundings.

It is safe to say that the cupola may always be removed to

the betterment of the house, most of the old porches also come under the ban, and the sawed-wood decorations, product of over-ingenious and ill directed artisans, find a more fitting function in the wood-pile. Fortunately, the newest developments of plan required by modern living, the first floor laundry, the breakfast-porch, the servant's dining room, and the sleeping porch, are the greatest help in redesign. A porte-cochere properly managed is a helpful adjunct, as is also the end porch in distinction to the old front porch. The fact that we are beginning to enter the house on the road side and live out-doors at some other point, often in the seclusion of a garden at the rear, gives opportunity for terraces and steps, little refinements which help immensely. Lattice for vines, flower boxes and pergolas are useful and ornamental in themselves and invite that greater charm of flowers. Low sweeping roofs, extending the old gables, may give just the needed invitation to summon home a hovering charm.

I have just explained that by varying the dimensions of well known parts of a house, the conception of the size of the unknown parts may be influenced. Thus an extra low step or extra small door, or a series of little windows may make the building itself look larger than it is. Similarly, one story additions at the sides of a building increase the apparent size of the central part. These low parts may be so arranged as to give interest to the outline of the building, and so, not only improve its scale, but its actual form as well. Although it is difficult to affect the scale of an old building by steps and windows which are usually fixed in the old work, yet terraces, entrances and low additions are usually possible and always effective, and the present-day niceties of service-wing, breakfast room, conservatory and end porch, may help in this way to rejuvenate the house born two-score years ago.

Here it may be well to tell the advantage one has in adapting an old building to its site over starting anew. In the old days such a fine point as building neighborly to nature was never considered. A house was a house; the same house, on a hillside, in a valley, in the woods, or on a plain and it was just dumb luck if it happened to



AN EARLY VICTORIAN VICTORY.



Squires & Wynkoop, Architects.
HOW THE REDESIGNER LEFT IT.



THE OLD BOWNE HOUSE AT TENAFLY BEFORE IT WAS REDESIGNED.



Squires & Wynkoop, Architects.

WHITEHALL TODAY, THE HOME OF MR. W. H. NOYES.

hit it off in its surroundings, however well Old Time toned down its incongruities. But trees and vines and turf need time, and time the old building has provided if nothing else.

So the redesigner has the rare opportunity, not possible in new work, of studying a building in connection with matured surroundings. His wider survey helps him to see its faults and overcome them. He can clip a lofty gable or tie down a towering mass by means of low wings or porches on its sides and then with harmonious colors, paint the whole building into its back ground of verdure and with trees and vines cover what he cannot cure. He can model, paint and plant, at the very site, life-size into the final picture.

Long ago there was built at Tenaflly, a tin roof and cupola creation with a one story porch on the south and east. For some unknown reason the entrance was made on the side and not on the street, a scheme successful enough in picturesquely straggling dwellings, but never in one of so mathematical a make-up. Around it, as if to cover its disgrace, splendid trees had grown and the lines of its site had fallen in pleasant places. When the redesigner started to improve this building, the task seemed will-nigh hopeless because a regular arrangement of windows was its only saving grace. "It is a shame that the whole thing cannot be covered up," he said, in peevish desperation. The words were his clue and his clue was a colonnade for that is the only architectural way to cover up a building. Look at the two pictures. Instead of its bald and ugly walls, there is nothing now to see but a classic order hiding the old monotony under deep and interesting shadows. The shaggy evergreens accentuate the crisp gradations of light and shade and shadow which have ever modeled classic contours.

Just as bad in itself and without the advantage of good natural surroundings, was the Plainfield house. This is chosen as an example of that type of buildings of mid-Victorian persuasion so common thirty years ago. A brutal plan, broken by narrow bays carried to an awful height, and the whole too lofty mass covered with a tin roof without form and void, and shrieking thence via

cupola to heaven, has for its only saving sense a solidity which has paid little toll to thirty years of usage. The redesigner first stripped off its worst features, the band-sawed-porch and cupola appendix. Then he made a little entrance at grade and invited you to enter through a lich gate. He mitigated the severity of the side walls by carrying them out to form the profiles of the porch and by lengthening it gave the impression that the house rested solidly on the ground and had lost that avidity for aviation which had always marked it. A little lattice work to reduce its height by division into frieze and field and the trick was nearly done. A finishing touch with the warm color of lime-stone over the stucco and olive-green over the wood work, and the house has been lifted out of the dark ages. It has been given scale through lich gate and low entrance, interest through porch profiles and charm through restful colors and now all's well, though ninety-nine per cent. is the work of a builder, long since taken to a just punishment from the scene of his misdemeanors. You see then that it is by tricks of the trade that the designer guides his hand, and nowhere is his intimate trade-knowledge better seen than in "new lamps for old."



Squires & Wynkoop, Architects.
A HOUSE AT NEW YORK UNIVERSITY ASSISTED BY
CONCRETE DECORATION.



Squires & Wynkoop, Architects.
IN THE CHURCH OF ST. LUKE THE EVANGELIST AT ROSELLE, THE HORIZONTAL
BANDS ARE CONCRETE.



Rossiter & Wright, Squires & Wynkoop, Architects.
VYGERG FARM AT OAKLAND WHERE MR. EDWARD D. PAGE HAS USED CONCRETE TO GREAT ADVANTAGE.



THE ENTRANCE TO THE LIBRARY AT VYGERBERG FARM IS AN EXAMPLE OF
ADVANCED CONCRETE CONSTRUCTION.



THE TEMPLE ON THE HILL TOP AT VYGEBERG FARM IS OF CONCRETE IN COMPRESSION ONLY.

CHAPTER XI

Tile and Concrete Partners.

THE more I have studied hollow-tile, the more I have been impressed with the necessity for its collaboration with concrete. For wall-building, to-day's laurel goes to the mortared unit hollow block and up to now the victor is the hollow tile. But where bending strains are present as in all forms of floor construction, reinforced concrete is the only available masonry. Decoration of the tile walls is often best in the more plastic concrete and so here and elsewhere there should be co-operation rather than contention between the two materials. This article argues among other things for concrete columns to take the place of wood. It seems not reasonable that the structure of the walls should have advanced in permanence beyond the point to which have gone their architectural embellishments. The costly and conspicuous should not be the evanescent.

The Church of St. Luke the Evangelist, at Roselle, signifies much in these pages because it was the success of its hollow walls of brick which encouraged me to try the same principle in hollow-tile. The permanent decorations of this church were the ornamental bands so clearly seen on the exterior, more effectively used within. A noteworthy comparison in the price of stone and ornamental concrete exists between the limestone altar and these mural decorations for the little altar cost more than all the concrete.

In the Keiser house, shown on page 77, the piers are masonry and a good deal of structural concrete has been used in floors and girders. Large cement areas are provided for porch floors and steps. Here hollow-tile and concrete conduct a very even partnership. Sand-moulded slabs show concrete doing more than its share

as decoration. In such buildings as the Schaeffer house on page 56, concrete is doing structural work.

The Newhall house, on pages 199 to 203, shows the most advanced ideas in hollow-tile and one of the most recent thoughts in concrete in its use in porch columns.

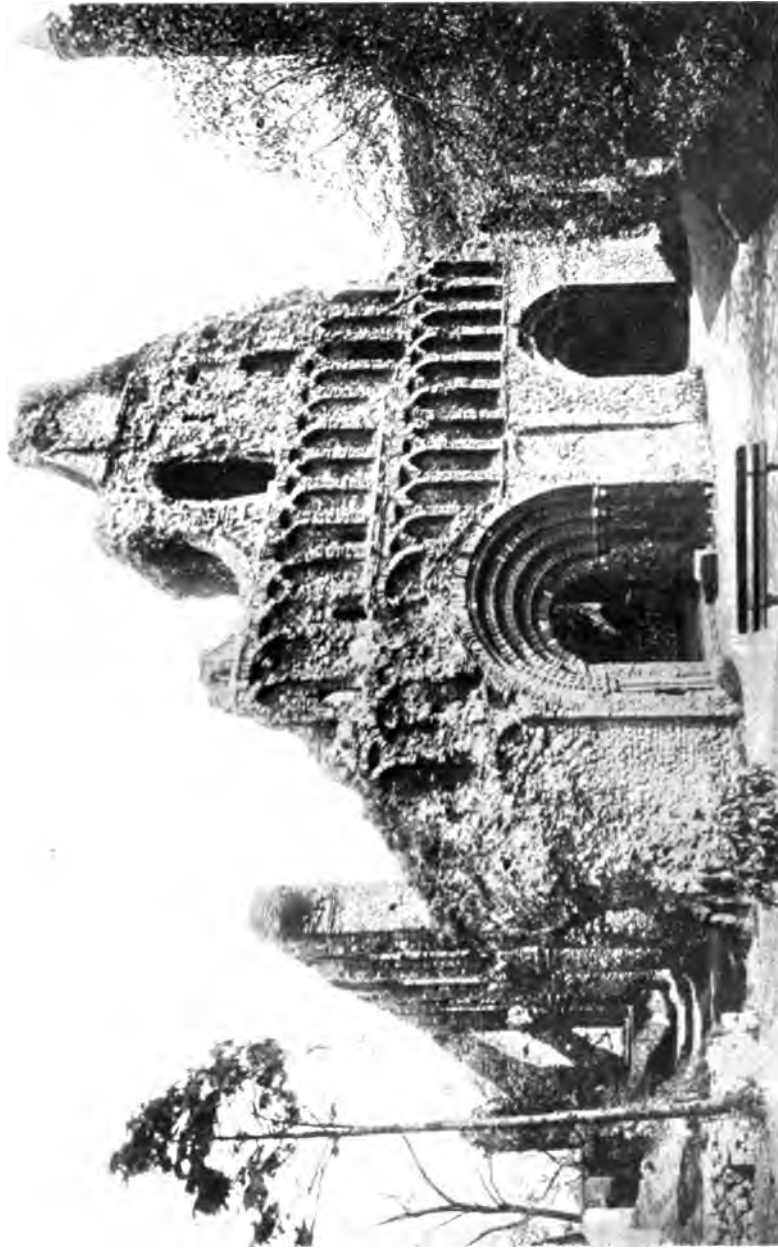
Most important architecturally is the poured concrete column. Fourteen of these were made in place in a single plaster mould at a less cost than ephemeral wood. It is a demand of logic that isolated supports should be of a material more powerful than continuous walls, and here we have heard the call and answered it. I consider this substitution of a more permanent material at a lower price to be the kind of forward step which marks true progress in construction. Having improved the structure of the shell, we have drawn even with it by improving to a similar extent the solidity and permanency of its structural and architectural adornments.



**TEXTURED ROMAN BRICK IN THE PALATINE ARCH. THE ITALIANS WERE FAMILIAR
WITH MOST OF OUR MODERN DISCOVERIES IN BRICK MAKING.**



PERSIA KNEW THE VALUE OF TEXTURE IN CERAMICS AS WELL AS IN RUGS AND
SILKS SHE WOVE MASONRY DESIGNS INTO THIS MAUSOLEUM OF A
DEAD SHAH AT SAMARKAND.



THE SAXON RUIN OF ST. BOTOLPH'S PRIORY NEAR COLCHESTER HAS BEEN TEXTURED BY TIME AS WELL AS BY THE HAND OF MAN.



SAN STEPHANO AT BOLOGNA MAKES MODERN EFFORTS AT TEXTURED MASONRY SEEM UNINSPIRED.

CHAPTER XII

Texture and Scale.

TEXTURE is a fundamental part of all things beautiful. Nature displays it in green trees, waving grain, snow, sky, and sea. Texture is infinite variety. Natural beauty depends on texture, and all art by the hand of man must do the like, or by its loss fall short of Nature's standard.

It is then but a thing of course that the artisan must follow the artist and so we see texture produced by the maker of tapestry, by the rug weaver, the fabric spinner, the metal worker, and him who fashions for the building craft.

In ceramics as in fabrics beauty depends on texture of color and of surface. Color texture is the ensemble of small units varying each in a small degree from its neighbor. The general tone is a blend of all of them, but always with the interest of the contrasts. Surface texture is a thing of shadows. It is the play of light and shade upon a roughened surface and it is enhanced if the units of the surface and their dividing lines make up a pleasing pattern.

To illustrate these truths, I have chosen pictures of brick work, both ancient and modern, to which I shall refer in my story of the hollow-tile house, both where the house is covered with brick work embodying these features, and when these principles have been embodied in making and using the hollow-tile itself, for hollow-tile has lent itself so well to a textured surface that when exposed I have called it "Texture-Tile."

In all brick, old and new, the method of its making has been the same. Solid lumps of clay have been burned and their limit in size, has been determined by that of the single piece of building clay which could be burned through to the center without destroying its outer surfaces. A simple modern invention has cut this

Gordian knot and now the size of the burnable clay unit is restricted only by its weight, for the clay has been made cellular, and although the thickness of burnable clay remains as limited as it has for the last two thousand years, yet a cellular block can be produced many times brick size. This larger block is far more economical in every way than the brick which it is destined to supplant, so that the problem which the designer has to face is not how to avoid this big building block, but how to use it.

The brick size was not a deliberate artistic choice but on the contrary was settled solely by the limitations of brick-making. Bound down to the fixed size of brick, the wonders worked by the designer and the craftsman so well shown in the photographs, have been wrongfully attributed as virtues of the size of brick rather than viewed as triumphs over limitations as is the very fact. A brick is the smallest structural unit ever used. Were a talented designer given an outline drawing of any building and told to divide it into the most pleasing building-units, his resulting lines would never indicate divisions but three inches high. I say again that were it not for the physical limitations and the inertia of tradition, the brick size would never be a free choice as a unit of design. This claim is not confined to brick work, for it has been proved by every other building material as well, that a larger unit is in better scale.

Shingles show best when laid wide to the weather and I will show and describe several such buildings. The Best house would have lost all charm with three-inch shingles, but with a covering of wide spaced shingles it had a chance. I will say a few more general words about it for its other interests are due to a picturesque environment and the very difficulties of the rugged lay of the land have required, in overcoming them, a building of some character. The site is a narrow ridge of rock, the highest point anywhere about, and to keep the house from looking like the Ark stranded on Ararat was a problem. Furthermore, the only approach is by road along the north side, although the best view and exposure are opposite. A sheer fall of rock at all the other sides completes the unfortunate round.





SAN STEPHANO. THE NEARER TO THE SURFACE THE GREATER ITS
RESEMBLANCE TO A FABRIC.



SAN STEPHANO CLOSE AT HAND THE WORK IS KALEIDOSCOPIC.



THERE IS TEXTURE IN STONE, BRICK, SLATE AND VINES IN THIS FIFTEENTH CENTURY HOUSE AT LINDFIELD, SUSSEX.



Carrere & Hastings, Architects.

NEW-OLD BRICK EFFECTS.

Porch over the rock, entrance hall and porch straight on the centre of the view, living room and dining-room turned toward the sun, kitchen isolated and all perched along a narrow ridge of rock a hundred feet long and only one room wide, such was the solution of the site. It is well to notice that the success of the plan depended on placing the rooms so that the long side of each was at right angles to the long side of its neighbors. The result is that one feels a pleasing contrast in form and direction when passing from one room to another. It was endeavored to make the house look as though it was rooted in the rocky ridge and had not been merely marooned by a receding tide. Here also was a new consideration in composition. The bold contour of the rock required a house of rugged build to hold its own. The general outlines mount up like the hill. The low porch and kitchen flank the three stories of the main house and the transition is made by the long outer sweep of the gables, making the building pile up to the centre. The high part of the house takes in three rooms, and the porch and kitchen wing one each, which you may trace in the exterior. The ingle-nooks form two additional parts, very much smaller than the others, between the big and little masses, and their expressions on the outside in narrow windows between the chimneys and the high part of the house, gives by contrast a sense of additional size to the whole building.

The materials and colors as well as the contour bind the house to its environment. The stone for walls and chimneys came from the rock on which the building rests. The brown of the woodwork, the tarnished silver of the shingled side and the leaf green of the roofs are wood colors like the woods around.

Leatherstocking Farm House is another example of the advantages of large scale in shingle units and is as well one of the most interesting works on which I have ever been employed. I'll take a recess from tile and tell you about it.

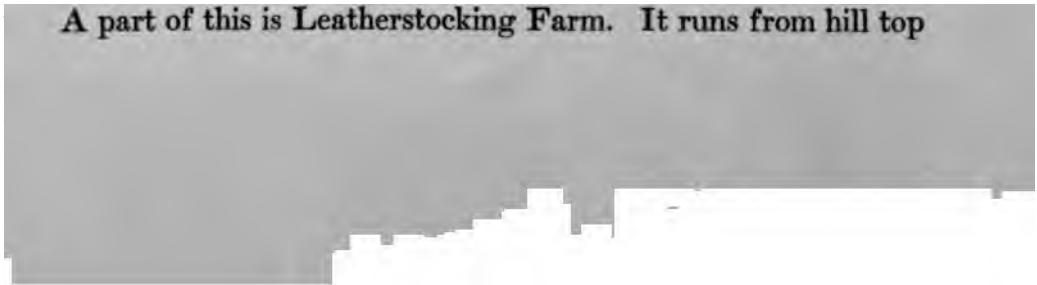
The Indian Story Teller has made so familiar to us the haunts of Pathfinder and Deerslayer, that it is like going back to boyland to read again of Leatherstocking, and it is satisfying to find that

the region of those all entrancing Indian tales, is still of romantic beauty. Otsego, a glimmering lake, densely wooded and set in a hollow of the hills, still whispers to storied shores as it did in the days of Leatherstocking, although the Indian is gone and Deer-slayer lives only in his bronze effigy on the village green.

One rides to-day from Cooperstown along the splendid lake road to get to Leatherstocking Farm. All along the way are familiar Indian names like Otesega. Your guide will point out to you places, whose very names bring back the delightful shivers of a story read ten or twenty years ago. Two miles along, we leave the road and climb the hill top and our first sight of the farm is Leatherstocking gorge. At its end, seen through a vista of long-stemmed trees, is the bold leap of Leatherstocking Falls, whose cavernous voice has given the sight increasing mystery, while our dizzy height above its jagged water-bed, lends just the needed touch of fear to make its picture permanent. The music of plunging waters, with ever changing outline, following many a fighting force, is a perfect prelude for the great opening scene.

We cross the bridge above the falls, pass through the trees that fringe the brook and emerge on a never-to-be-forgotten sight. A few steps into the open and we are at the focus of the view. It is as though Nature had put a compass point right here and with the other, struck off segments of great, ever widening circles. We look far down to the lake and up again to our own level on the distant horizon. Right in front, at our feet, is a greensward, falling away and terraced with ledges of outcropping rock. At its end, with our station point as a center, swings a black circle marking the wooded course of Leatherstocking Brook, then a circle of green meadow, divided from the glistening waters of Otsego by a fringe of blackest pines. Then, miles away, sweep the great wooded curves of the lake's further shores, and from them, hills rising to horizon, circling arcs of natural loveliness, ever widening, each successor grander than its neighbor, lawn, meadow, lake and sky outlined by bands of noble trees.

A part of this is Leatherstocking Farm. It runs from hill top





Squires & Wynkoop, Architects.
LIKE THE TEXTURE TILE UNITS THE BIG SHINGLES HERE ASSIST THE SCALE.



TEXTURE AND BIG SCALE IN THE STONE AND SHINGLE OF LEATHERSTOCKING
FARM HOUSE.



Squires & Wynkoop, Architects.

TEXTURE IN TREE-COVERING AND HOUSE-COVERING.



NATURE'S NEXT DOOR NEIGHBOR



FAR AWAY A GLIMMERING LAKE.



THE OLD SAND STONE OF THIS DUTCH FARM HOUSE AT LEONIA, N. J., IS THE SIZE AND SHAPE OF TEXTURE
TILE. THE SHINGLE COURSING IS WIDE AND STRONGLY MARKED. BOTH ADD TO THE CHARM BY
CONTRAST WITH THE DELICACY OF THE WOODEN DETAIL.

to lake. Leatherstocking brook strikes one border at the upper end, crosses the farm and enters Otsego at the lower border. Opposite the brookside is a grove of lofty pines, and on their edge is Leatherstocking Farm House. Let us forget that center of sight, the wonderful point-of-view where nature encircles us with grandeur. Consider for a moment a modest house on the edge of a wood. Placed on a hillside, and rather large, it had to take a long form so that it could find a level place to rest on. The most obvious feature of its external appearance is its outline. A low service wing and a casino flank a high central mass still further accentuated by chimneys at its gable ends. This effect of central height has been achieved by considerable ingenuity in plan, for the second story of the servants' wing has been depressed below the line of the main building and has no third floor at all, while the center boasts the height of four.

The fall in the ground from front to rear has been used to give the big rooms and porch a lower floor and greater height than the small rooms, while the kitchen and casino are kept at the lower level. It is by such means that in appearance the house sticks firmly to its sloping site, yet has a varied skyline. What holds it naturally to its environment of outcropping rock and rearing pine are its materials and colors. The stone was blasted out of the cellar excavation and the roofs are pine-green. You could cover them with green pine needles, and never see the difference. The cypress shingles on the house are wood's color, like the dead pine needles of the forest's floor. Half in the shadow of the woods, wood's colored and old-fashioned, Leatherstocking Farm House is Nature's next door neighbor.

From inside, every window frames a picture. One is a mulioned panel of deep green pines, one is a landscape of sky and distant lake seen through pine boughs, another a long painting of tree-bordered Leatherstocking Brook, beyond a terrace of jutting rock, topped with green lawn and splashed with a water-fall of fern. Best of all, no picture is long the same, for every hour the sunlight changes, turning green pine to black, or the wind blows the silver


powder off the lake, or dapples it with foam. There have been a thousand pictures in these dozen frames, and never one that was not lovely or mysterious. Wild creatures creep or fly into the foreground or appear, half hidden, in the background, always in harmony with the other colors in Nature's accidental composition, adding beauty of swift movement, or sweetness of wild music to her visible perfections. I know of nothing that could better teach a child, than to steep him in Leatherstocking tales and let him spend an afternoon in the play-house with the rain falling on roof and woods, with wild and mysterious things in the forest in front and home just beyond the cloistered passage.

It is the work of an artist to build a house and then conform a landscape to it. It is no less an artist's task to take a God-made landscape and slip a house into it and not disturb a tree, a view nor a tradition.

I would call this full measure of success: if a receptive man might follow along the gorge and past the falls, view then that outlook which woke stories out of Cooper's heart, and glimpsing Leatherstocking Farm House, take but casual count of it in his harmonious impression.

I have just ridden past those twenty mile stones from Philadelphia westward, marking the most beautiful of all our suburbs. I lay a large share of their unquestioned charm to the fact that most of the houses are built of stone. They have texture and scale as titles to distinction. The size of the ashlar puts the moulded woodwork and the muntined windows in interesting relation, an effect heightened by the pleasant color of the stone.

By way of sprightly contrast, yet still within our study of scale, let us look at the little old Dutch farm house. It owes its charm to the largeness of the brown-stone ashlar of which its interesting walls are made. The charm of every one would diminish with any reduction in the size of its covering units. Therefore the size of Texture-Tile.





THE NAVE OF THIS OLD CHURCH AT BROGLIE IS BUILT OF
STONE NOW USED FOR THE THIRD OR FOURTH TIME
AND CUT DOWN IN SIZE BY EACH REBUILDING. IT
IS NOW HALF WAY BETWEEN BRICK AND
STONE AND HAS JUST THE SCALE
OF TEXTURE TILE



Squires & Wynkoop, Architects.

**THE GARGOYLE GATE AT WILLIAMS COLLEGE. "IN SCALE WITH
MOUNT GREYLOCK."**



Grosvenor Atterbury, Architect.

THIS IS AN EXCELLENT ILLUSTRATION OF THE EFFECTIVENESS OF A SCALE
LARGER THAN COMMON BRICK. HERE THE SIDE NOT THE EDGE OF
THE BRICK IS EXPOSED.



THE CHATEAU DE BIZY AT VERNON.



THE EAST FACADE.



McKim, Mead & White, Architects.
THE MORGAN ART GALLERY.



THE PETIT TRIANON AT VERSAILLES.



PETIT TRIANON. SIDE TOWARD THE GRAND TRIANON.



Charles A. Platt, Architect.

RESIDENCE OF WILLIAM G. MATHER, CLEVELAND, OHIO.



Delano & Aldrich, Architects.

THE WHITNEY STUDIO AT ROSLYN, L. I. A FLAT-ROOFED BUILDING
OF HOLLOW-TILE.



Carpenter & Blair, Architects.

HOUSE AT GREENWICH, CONN.



Carrere & Hastings, Architects.
RESIDENCE OF MR. MURRY GUGGENHEIM. NORWOOD PARK, WEST END, N. J.

CHAPTER XIII

The Flat Roofed House.

IT has been claimed that architecture should express its purpose. Architects are urged to so design as to tell the truth, the whole truth, and nothing but the truth. Yet, in spite of all such warnings, the critic is sometimes called upon to expose the *tour de force*, to tear pretty mask from haggard visage, and such like cruel things. How refreshing, then, to find a material in some of whose uses it is harder to lie than to tell the before-mentioned truth. Such is concrete for roofs. Since all concrete is at one time fluid, and since all fluids seek their own level, a law of physics aids the critic and enforces his teachings of architectural rectitude.

Since a concrete roof or a tile and concrete roof needs must be nearly flat, the designer cannot lie about it, so he evades the issue. He designs a building fireproof up to the eaves-line, and thus far takes his client carefully along the straight and narrow path with arguments for safety and stability to get him so to build. What then? Behold, he turns about!

"My dear client, here is the roof. A building must have a visible roof. The figure must have its hat. The *design* demands it."

"But is this also fireproof?"

"Why, all but its wooden frame."

"Well, why do not the arguments by which you won me to fireproof construction hold as well for the roof?" asks the tedious client.

Now, if our architect is honest, he will say that his conception of this particular building requires a picturesque skyline of dark-colored slate or rich-colored tile, and that he can't build that kind of a roof fireproof, for a reasonable cost. If he is very frank and honest, he will say that the flat roof is the only inexpensive fireproof roof,

but he doesn't like a flat roof, and whether the roof be inflammable or not he is going to stop his logic at the eaves and get the artistic effect that he desires, defensible or not. The client, not dominated by such artistic dictation, must needs have his faith in fireproofing most rudely shaken when he finds that its very sponsor has not the courage of his structural convictions when it comes to discarding a merely artistic effect.

Now, if an architect will not design a flat-roof house, he must have a good reason for such refusal. It must be a real reason, because nothing else could force a man into the position of logic-only-to-the-eaves, and I believe that his is an honest prejudice which depends on the fact that as a designer he does not wish to originate in a new material, after having seen the many bastards so conceived. But he has overlooked fair architectural precedent which I am striving by a few illustrations to recall to him.

The flat roof is almost universal in the commercial buildings we see about us. Irrefutable arguments of cost and building law have pinned the architect to the flat-roofed type, and accepting the conditions, he does creditable work. The other illustrations, chosen at home and abroad, suffer little from the uneventfulness of their skylines and their precedent is unimpeachable. In no one of them was a flat roof a necessary condition of structure, but a deliberate artistic choice. I haven't tried to show fireproof roofs, but just good architecture.

It will be remembered that many a building shows a roof in elevation which shows nothing above the cornice when looked at from the ground. If such a building is successful, it would be equally successful if the vanished roof had never been. Many a good designer has been scared away from logic-above-the-eaves by the exotic results produced by incapable men in trying their hands at expressing a new material, but that there is plenty of precedent for serious, scholarly design the illustrations prove.

Look over the photographs you bought the last time you were abroad, and ponder prayerfully whether artistic requirements above its eaves will wreck the logic of your next fireproof house.

CHAPTER XIV

An Interesting Experiment.

THE house shown in these pictures is the pioneer in Texture-Tile. Its unusual form is the outcome of an unusual situation. From the side of the hill opposite its approach circles a panoramic view bounded only by the distant horizon, and the wings of the house are folded back so that every room commands it. In so far as this description is concerned, however, it is the structural aspect of the building which will be considered.

This house was designed originally to be stuccoed, and the cost of the entire structure was twenty cents a cubic foot. A wall of Texture-Tile was substituted at no additional cost over the stuccoed wall. In other words, this contractor estimated Texture-Tile to cost the same as the older construction.

Great care was taken in the office and all the drawings were laid out to exact tile dimensions, both horizontally and vertically, so that no Texture-Tile should be cut, and the two lowest courses were laid dry all around the building before work was begun, to show how it should work out. This kind of planning resulted in an accurate and rapid piece of work. Three sizes of Texture-Tile were used—the stretcher, the half-stretcher, and the corner block. The last was L-shaped, showing a stretcher length on one side and a half-stretcher on the other, and has since been abandoned in favor of a simple rectangular corner block like a brick.

The openings in the stretchers are horizontal, but in the corners had to be vertical so as to show no exterior apertures.

In this instance the Texture-Tile was made from a Jersey clay, the rough surface being obtained by mixing broken tile with it and then shaving the surface with a taut wire before the blocks were put in the kiln. More successful is the use of shales, such as

those from which the western and Pennsylvania rough brick are made. This tile should find a use in the most dignified building; and schools, hospitals, hotels and minor public buildings, the stuccoing of which combats a popular prejudice, will be cheaply and effectively executed in Texture-Tile. This material will remove the last objection from the minds of those architects who do not favor the use of hollow terra-cotta tile as a material for the outside walls of buildings. It is also interesting to note that it is always possible to make brick at the same time and from the same clay as Texture-Tile, which allows a unit of new size for use in the design with no unpleasant variation in color or texture.

As is to be expected in a pioneer, there are defects in this first house. The corner blocks were fired twice because the first firing did not burn them dark enough, but the second firing burned them too dark. Where the piers are narrow these corners nearly meet and make unpleasant stripes. There is a trifle too much variation in the colors of nearby tile which even the rough-surfaced, neutral-colored joint does not entirely overcome. But, all things considered, the result is highly successful for the artistic test is the answer to the question as to whether or not one would stucco the building, and to this, for all who have seen it, the answer of architect and layman alike is an emphatic "no."

The greatest charm is its color, for it looks like a rare old Oriental rug. The ensemble is solid and dignified and looks like a house there to stay, and there is no possibility of mistaking its real construction.

The wall has the charm of all things put together by hand, the craftsman look. The variation in thickness of the joint, the surface of the joint itself, the slight variation in courses, all combine in a pleasing result.

An examination of the photographs will give an idea of the texture of the surface and even its variations in color, for all the principles of texture have been applied to Texture-Tile. In many cases there is a decided change in color in the unit itself, and where it is hard in brick to get sufficient variation of color, it is easy to



Bungalow for Mr. Horace D. Lyon, Englewood, N. J.

Frederick Squires, Architect.

THE FIRST BUILDING OF TEXTURE TILE.



THE ARTICULATION OF THE SURFACE CARRIES A GREAT DISTANCE.



A WALL LIKE A BOKHARA RUG.



Bungalow for Mr. Horace D. Lyon, Englewood, N. J.

EVEN THE COLOR TEXTURE IS APPARENT.



Albro & Lindeberg, Architects.

WHEN BRICK IS SET WITH ITS BIG SIDE OUT IT GIVES A HAPPIER APPEARANCE.
THAN IN ANY OTHER WAY.



Grosvenor Atterbury, Architect.

THERE IS A TEXTURED SURFACE FOR EVERY INCH OF THESE
INTERESTING HOUSES.

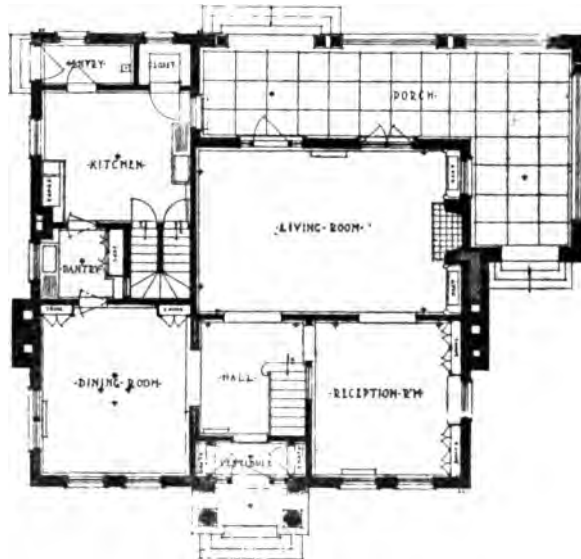


House of Mr. Patterson.

Ernest Green and Lucius Clark Main, Associate Architects.
A HOUSE THAT IS AS INTERESTING AS ITS REMARKABLE SETTING.

get too much in tile. As to the economy of the large unit, there is no chance there for argument, for a mason can lay a Texture-Tile block in the same time it would take him to lay a brick, for the block is small enough to be handled with one hand. The cost of the houses here mentioned, furnish ample proof of the economy of labor and material.

The detail of the outside of the porch is noteworthy in that the texture of its wall holds its own with the little evergreens—a most



FIRST FLOOR PLAN

PLAN OF HOUSE SHOWN ON PAGE 197.

velvety kind of foliage. The picture indicates the variation in color of adjoining blocks which could not be more happy if the blocks were carefully selected instead of being used as they happen to come. There is to the pictured wall, a velvet tone from the millions of tiny shades and shadows cast by the roughened faces of the blocks. The wide, uneven joints made with cement and cinders, are in character with the wall itself, and their neutral gray tones down the contrast of the colors.

The picture of the inner porch wall does not do justice to the charm of the reality. It is colored like a Royal Bokhara rug, and its surface varies from that of the rug only in the pattern of the rough, gray mortar joints.

The working drawings of a Texture-Tile house should show the position of the facing and backing, figured to tile sizes. A set-



PLAN OF HOUSE SHOWN AT THE TOP OF PAGE 200.

ting plan should accompany it, showing the exact number of tile and which tile are omitted for door and window openings, themselves always in tile dimensions. The elevations should show the number of tile in the building, but the setting plan proves of greater service to the builder.

It is not every experiment that has such a happy ending as this first house of Texture-Tile.



SUCH MASONRY NEEDS LITTLE HELP FROM WOODEN DECORATION.



House of Mr. R. C. Garbice at Englewood, N. J.

Squires & Wendehack, Architects.

THE WALL LOOKS LIKE THE NATIVE ASHLAR.



House of Mr. Henry B. Newhall, Jr., Plainfield, N. J.

Squires & Wendehack, Architects.

THE WALL IS OF TEXTURE TILE IN ALL THE WOOD COLORS.



THE PLACE IS CALLED THE "BIRCHES."



THE BIG TULIP TREE IS NEARLY AS CHARACTERISTIC.



House of Mr. Atwood, Tenafly, N. J.

Squires & Wendehack, Architects.

TEXTURE TILE WITH WIDE MORTAR JOINTS.



House of Mr. K. B. C. Smith, Tenafly, N. J.

Aymar Embury II, Architect.

HERE THE RESULT IS VERY LIKE THE LOCAL STONE WHICH IT WOULD HAVE BEEN NATURAL TO USE. THIS HOUSE IS REVOLUTIONARY IN MORE SENSES THAN ONE.

CHAPTER XV

The House of Three Inventions.

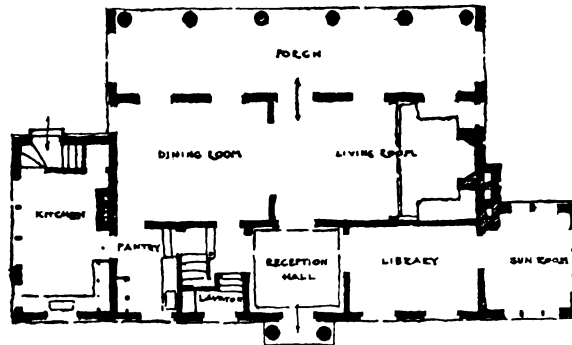
THERE are historic houses, houses famed for some association, and houses famous for themselves. My historic house is the one which shows in color in the frontispiece and in photographs around these lines.

Every architect builds more or less of his life into his houses. Most of his hours have been spent on them, and these hours are gone, lost forever or immortalized. The client can never realize how much the architect freely gives for which he expects no other reward than the fulfillment of his vision. "The zeal of thine house hath eaten me up" has sometimes been his true though uncarved epitaph. The zeal of his house devours the days of each sincere designer. The extent to which he puts himself into his work is the true measure of his success. All have limitations, but one produces results nearer to his abilities than another. The real test of making good is the span between ability and accomplishment. The architect magnifies the width and depth because he confuses abilities with desires, and there is forever a great gulf fixed between artistic aspiration and its accomplishment.

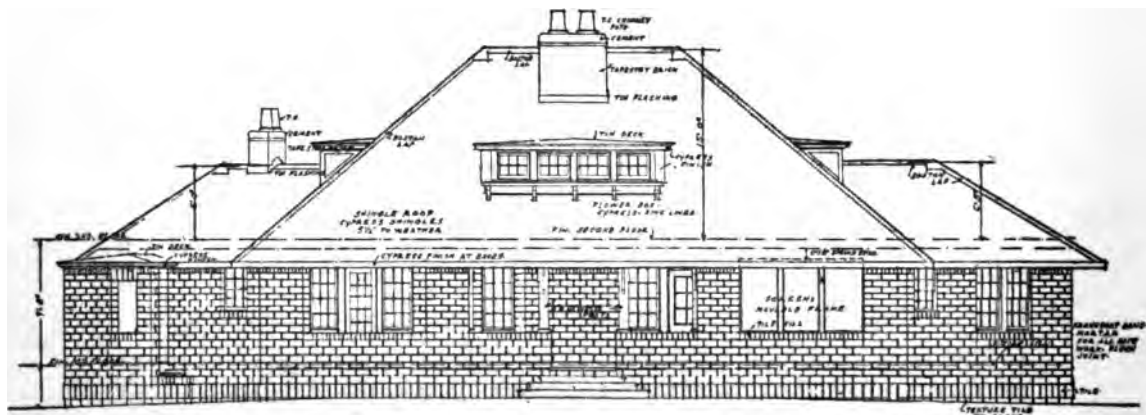
The Texture-Tile house will always be one of my landmarks, not because it is a good house, for it is full of faults, but because it is honestly ambitious. It is not desirous of looking other than it is, but it is ambitious to exemplify those principles of construction which it has set up as its ideals. Choosing not the stucco garment of conventional fashion, it has appeared in its own proper person in honest coat of tile. Long before it was built, its dress was designed in the colored drawing which forms the frontispiece of this book. This was the house's first invention. Day by day, the fight was fought to materialize the vision, and although not first



ELEVATION OF THE TEXTURE TILE HOUSE.



FIRST FLOOR PLAN OF TEXTURE TILE HOUSE.



Bungalow for Mr. Horace D. Lyon, Englewood, N. J.

Frederick Squires, Architect.

ELEVATIONS SHOWING ARTICULATIONS OF TEXTURE TILE.



House for Lewis Squires at Netherwood, N. J.

Frederick Squires, Architect.

A GRACIOUS INTRODUCTION.



FRAMED IN OAK.



A SHARP PICTURE LIKE THIS IS THE ACID TEST OF TEXTURE TILE.



TILE IS THE BIG BROTHER OF THE BRICK.



THE PORCH AND PLAYGROUND ARE ON THE SOUTH.



SURFACE TEXTURE IS THE RESULT OF MILLIONS OF MINUTE SHADOWS.



THE BONDED WALL



THE HALF STRETCHER.



THE STRETCHER. NOTE THE
ROUGH SURFACE.



THE CORNER AND JAMB BLOCK.

THE HOUSE OF THREE INVENTIONS 207

accomplished here, for the quicker moving operation just described carried off the palm, yet this building, taken in stretch of time, from conception to material completion, was the leader.

Although following tradition in the gabled roof, it has the courage of less conservative convictions in the flat roofs on either side. From its wings to right and left, the inventions of Beveled Block and Sand Mould made their debuts upon the stage of progress. It is my selfish hope that real advances in building may look back on this little house of Texture-Tile as the source of their success. In its short span a hundred houses, a railroad station and an office building have followed its teaching of externals. The beveled-block and sand-mould ceilings found quick success within its walls, and fireproof roofs were shown in it to be inexpensive and attractive. For these potent reasons it is as yet the farthest milestone along my architectural journey.

The Texture-Tile house is a monument to the materialization of theories. If a man is convinced that a theory is practicable, it teaches him to put it into practice. The chances are that his theory will work. If I believe that ground cork and cement may be mixed and spread smoothly over fireproof floors, trowelled true and smooth, and that this surface will have the good qualities of cork and the well-known advantages of cement; or if I believe that a hollow-tile may be mat glazed like beautiful ceramic tile, I should put it to the actual test. The chances are that it will succeed from the start, but if it does not work, another trail will open straight from its trial to success. It is sure that if I never try the theory, if I keep it stored in a dusty corner of my mental attic where moth and rust doth corrupt, it will disappear in dust or reappear in the completed work of someone less inert. I will confess that many new things in these pages are not the original thought, but the offspring of that thought. There is an old saying that "God will take care of the babies." He will take even better care of the babies of your brain, but not until you give them birth.

We live in days of progress. Make of them days of building progress! Two million women vote! The moving picture talks!

We telegraph through boundless space! Then shall we use Egyptian bricks? Shall we make Roman concrete, without steel? Shall we exhume our house plans from Pompeii? The day and generation cry advance! They crown initiative! And if architecture and building are to reflect the spirit of these stirring times, let their dead past bury its dead and their pulsing present build monuments to progress.



